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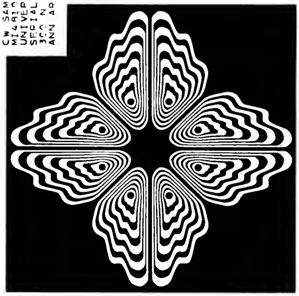

## 'Just for Fun'

That's why programmer/artist Kerry Jones creates artistic designs like this one, entitled "Nova," using curve-fitting algorithms. See story on Page 16.

# Secret GAO Report Slams Federal Standards Process

**By E. Drake Lundell Jr.**
CW Staff

WASHINGTON, D.C. — Bureaucratic ineffectiveness and an overreliance on self-interested private firms for the development of computer standards is costing U.S. taxpayers over half a billion dollars each year.

That is the picture that emerges from a still secret General Accounting Office (GAO) draft report on "The Federal Information Processing Standards Program: Many Potential Benefits, Little Progress and Many Problems."

"Federal agencies have become locked in to suppliers of computers and services either because certain essential [DP] standards have not been developed or agencies are not complying with existing standards," the "restricted" report obtained by *Computerworld* said.

"As a result, potential cost savings available through competitive procurements are not being fully realized," according to the report, which estimated those savings at more than $500 million per year.

### Commerce Draws Fire

In arriving at the cost estimate, the GAO said $450 million is being spent yearly to convert from one nonstandard higher level language to another version of the same language. Furthermore, the lack of a hardware I/O interface standard cost the government at least $100 million in 1969, the report said, estimating the loss "is much greater now."

The problem may get even more expensive in the future, the report indicated, because the government expects to replace 80% of its general-purpose computers — 8,500 systems — by 1985. Many of these will have to be replaced on a noncompetitive basis since there are few standards.

The basic reason for the lack of progress in this area — and the subsequent high costs — is that the Department of Commerce has relied too heavily on the private sector for standards development and has not managed its internal resources well, the report contended.

"Progress in the standards program has not been good because the government has depended too much on the commercial sector to develop standards," the report charged (see Page 5).

"Only 10 of the 29 federal standards have been developed independently," the report noted, adding "GAO found that slow progress has been made in developing commercial standards because large manufacturers can and sometimes do delay the voluntary development of commercial standards."

The report also charged that Commerce ' has not made the federal standards program adequately visible to Congress" and that budget requests for the program "failed to provide meaningful information on the scope and direction of the program which would justify additional funds."

### Vendor-Unique Languages

Even though Congress, the Office of Management and Budget and the General Ser-

(Continued on Page 4)

*Package User Finds*

# One Good Thing Leads . . .

**By Don Leavitt**
CW Staff

NEW ORLEANS — As the use of application packages grows, the number of installations using or considering a second or third system from the same vendor is also growing.

**CW Special Report on "The Art of Applying Application Packages" follows Page 48.**

William B. Riley & Co. is such an installation and its experience has been generally good, according to DP manager David Henry. The company has picked carefully, bypassed offerings that seemed too rich for its needs and taken advantage of special situations.

Riley is the nucleus of a conglomerate with subsidiary corporations in the food, food service, chemical and leasing industries. The DP center here currently has an IBM 360/30 and a 360/40, each with 128K memories, two tape drives, four disk drives and unit record peripherals under DOS.

With five programmer/-analysts (including one supervisor), three operators and seven keypunchers, the center averages two and a half shifts a day five days a week, although the markets in which the subsidiary corporations operate — coffee, for example — often put unpredictable loads on the systems.

By early 1976, Riley had installed a payroll system from Management Science America (MSA), an accounts payable system from McCormack & Dodge Co. (M&D) and a pair of utilities from other vendors. Riley wasn't even looking for anything new when M&D approached Henry six months ago.

Getting ready to market its

(Continued on Page 4)

# Trio Replaces Cyber 175, 176 Tapered

**By Frank Vaughan**
CW Staff

MINNEAPOLIS — Control Data Corp. has restructured the top of its Cyber 170 line, replacing its Cyber 175 with three models and making available scaled-down versions of its Cyber 176.

The firm also reduced the prices for add-on and extended memory for other Cyber models.

The announced replacements for the Cyber 175 are the 175-100, 175-200 and 175-300. Each is available with different configuration options.

The Cyber 175-100 offers 18% less performance than the present Cyber 175 at 70% of

(Continued on Page 2)

*A 1M-Byte System*

# M/600 Doubles DG Mini Power

**By Esther Surden**
CW Staff

WESTBORO, Mass. — Data General Corp. has continued the trend toward larger and larger minicomputer systems with the introduction last week of the Eclipse M/600, a system said to be twice as powerful as any previously offered by DG.

Designed specifically for business, educational or data analysis and reduction applications with a large number of users working on different tasks concurrently, the 1M-byte system can be compared to the Hewlett-Packard Co. 3000 Series II and the Digital Equipment Corp. PDP-11/70, DG said.

The system cannot be compared to the recently introduced Digital Equipment Corp. VAX/780 system because VAX offers "a different mix of capabilities" from the M/600, the firm noted. VAX was designed primarily for scientific computational applications while the M/600 is focused on the multiuser time-sharing environment, a DG spokesman added.

Present Eclipse users run-

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The Eclipse M/600 handles up to 64 concurrent users.

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## *Under Property Tax Law*

# Software Intangible: Tenn. Board

By Don Leavitt
CW Staff

NASHVILLE, Tenn. — "Software ... intangible property ... not taxable under the statute."

The words seemed to echo those of the Commerce Union Bank vs. Tidwell court decision of 1976, but a recent ruling by a hearing examiner for the Tennessee State Board of Equalization may become a landmark in its own right.

The Commerce Union Bank case was thrown out when the State Supreme Court held software was intangible and therefore not taxable under the sales and use tax statutes. The new ruling came to the same conclusion about software, but with reference to the personal property tax laws of the state.

Since this is the first decision regarding personal property taxes assessed against software, Gerald Young, the attorney for the petitioner, Cincom Systems, Inc., said he feels the ruling has significance for the entire software industry.

The Board of Equalization, through its appeals commission, acted on a petition filed by Cincom seeking relief from tax liabilities assessed against it last July for copies of its Total data base management system installed at user sites in Shelby County.

The taxing authorities had billed Cincom rather than the using organizations since Cincom — like most software houses — specifically retains ownership of its products under its lease agreements.

In contrast, Commerce Union Bank went to court because of taxes assessed against it for use of a software system leased from University Computing Co. The question of ownership was immaterial in that case.

The Board of Equalization's preliminary hearing in favor of Cincom was issued Jan. 5. Although either party may file an appeal, a board spokesman said none had been received by last Wednesday and he expected the hearing examiner to make the ruling final this week.

Young, pleased with the decision, said he had deliberately chosen the administrative appeals route, rather than the courts, since such an approach is much less expensive and state and the company work quietly on the problem.

"A court battle would very likely have been turned into a test case by other interested parties, and that would have added a whole layer of issues and emotions we just didn't want," he explained.

# CDC Revamps Cyber Line

*(Continued from Page 1)*

its price, CDC said. A minimum configuration with 131,000 60-bit words of MOS memory, 10 peripheral and control processors and 12 channels costs $2,257,536 and leases for $45,625/mo on a three-year lease. Maintenance costs an additional $6,811/mo.

A Cyber 175-200, configured like the 175-100 but approximately equal in performance to the current Cyber 175, costs 14% less than the present model, according to a spokesman. The purchase price is $2,794,166 and the lease price is $56,383/mo with a $7,568/mo maintenance fee.

The Cyber 175-300, which CDC claimed gives 112% of the present Cyber 175's performance sells for $3,263,632 and leases for $65,796/mo with maintenance costing $7,946/mo.

Each of the models in the Cyber 175 grouping is available with 196,000 or 262,000 words of MOS central memory at a cost of $258,000 for each 65,000-word increment, the spokesman noted. In addition, he said, each can be configured with the CDC peripheral products that are standard for all systems in the Cyber 170 series.

The smallest version of the scaled-down Cyber 176s announced by CDC is rated about halfway between the largest Cyber 175-300 and the present Cyber 176, according to the firm. The systems were developed by reconfiguring the current Cyber 176 without high-speed peripheral processing units or extended memory.

Prices for the Cyber 176s range from $4,426,800 to $5,226,800, with memory configurations expanding from 131,000 to 262,000 words. Lease prices range from $81,596/mo to $96,396/mo with monthly maintenance running between $12,870 and $14,870.

The entry-level Cyber 176s can be upgraded in the field to the larger unit, the spokesman said.

### Memory Price Actions

CDC also reduced its add-on memory prices by 20%, the first such action since a price cut of 15% to 30% in December 1976.

The price cuts affect memory for all existing members of the Cyber 170 family except for the Cyber 176s and latest Cyber 175 models.

Adding 32K words of memory now costs $79,295, down from $99,120; 64K words cost $154,645, down from $193,305, the spokesman said.

The memory price reductions are effective Feb. 1 for new customers and will be available to existing customers with leased systems upon expiration of current contracts, he added.

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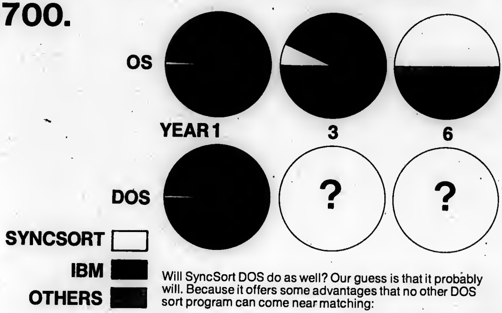
**Growth of SyncSort Popularity**



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# Report Comes Down Hard on NBS Institute

By E. Drake Lundell Jr.
CW Staff

WASHINGTON, D.C. — The "restricted" General Accounting Office (GAO) report on standards for DP equipment saves some of its harshest criticism for the management of the National Bureau of Standards (NBS) Institute for Computer Sciences and Technology.

After 12 years in charge of federal standardization efforts, only 15 of the 65 areas identified as requiring standards have been addressed by the Institute, the draft report said.

Furthermore, a later study has indicated there are about 120 areas needing standards and guidelines in the next five years, the report noted.

The institute has claimed the standards program suffers from a lack of funds, the GAO said, but pointed out that "NBS has not developed several standards within promised timeframes even when the requested funds were provided."

### Encryption Cited

As an example, the GAO noted the Institute had promised in congressional testimony to develop data encryption standard by December 1974, but did not issue such a standard until January 1977.

In fiscal year 1976, the institute promised to develop and publish 13 standards, the report added, but only issued two during the year. One of those was a revision of a previous standard.

Moreover, NBS has estimated it would take three years to develop federal standards, but "the average time taken to develop and issue a federal standard has been six years," the report contended.

And, while claiming a lack of funds for the effort, the institute has "not provided Congress [with] meaningful budgetary information on the scope and direction of the standards program which would justify additional funds."

Although NBS and institute officials claim that standards are their highest priority and that more then 75% of their budget goes for such projects, a GAO accounting found only about 23% of the funds are actually devoted directly to standards development.

In addition, the GAO found that the institute had failed to establish priorities for the development of standards which offer the greatest potential benefit.

"For example," the report continued, "in fiscal year 1976 only about 17% of the institute's appropriated funds were spent to develop standards [which computer-using agencies] identified as the most urgently needed. These include programming languages, networks and data communications links and interface standards."

Further, "NBS has not responded even when priorities have been clearly established for a particular standard," the GAO charged.

For example, the institute spent an average of $27,400 per year between 1966 and 1970 on an I/O interface standard. In 1971 Congress established that area as a priority, but NBS only increased its level of funding to an annual $44,200 average through the next six years.

"The absence of priorities has resulted in federal resources being used to develop relatively insignificant standards having minimal potential benefit while critically needed standards have not been produced for lack of funds," GAO said.

# Federal Standards Process Hit by GAO

(Continued from Page 1)

vices Administration have cited the use of higher level languages as a way to reduce conversion costs, the report pointed out that as of June 1977 only Cobol had been standardized in the government.

"As a result, agencies are using a variety of languages which are generally oriented to a particular vendor's equipment. The programs written in these languages must be converted at considerable expense when agencies change computer vendors," the report said.

The Geological Survey, for example, uses two nonstandard higher level languages for its scientific applications — and it would cost that agency over $5 million to convert to another vendor's equipment, the report said. The National Institutes of Health "also estimated it would cost $8.6 million to convert its programs written in nonstandard high-level languages."

### Cobol Problem

Furthermore, even in the one area where there is a standard — Cobol — many agencies are not adhering to it.

"Computer manufacturers, however, also offer nonstandard Cobol features designed especially for use with their equipment. These vendor-unique features may sometimes enable agencies to optimize the efficiency of their computers and reduce operating costs.

"Their use ... usually makes the programs unworkable on another manufacturer's equipment and necessitates partial program replacement if other equipment is used. Thus, although programs may be written in what is thought to be a standard language, the indiscriminate use of nonstandard language features can make the programs vendor-dependent and can result in higher conversion costs," the report said.

For example, it noted that the National Institutes of Health had estimated it would cost $3.7 million to convert its Cobol programs to run on another vendor's equipment, even though it was supposed to be using a standard Cobol.

# Firm Finds Use of Package Leads to Many Advantages

(Continued from Page 1)

General Ledger/Financial Analysis (G/L Plus) package, the vendor asked the manager if his shop would serve as a beta test site. "In all candor, we weren't in the market for a ledger system then. We thought we could limp along for another year or two with what we had," Henry recalled last week.

But the "limping" was getting worse. It was caused by a 10-year-old system created originally in Autocoder for an IBM 1401 and converted twice, first to Cobol D then to ANS Cobol. It had also been modified on occasion, but still worked with only one corporation at a time.

As a test site, Riley was offered the package at a cost considerably below its current list price. Even so, Henry and his crew took time to make a cursory evaluation of other systems before accepting the M&D offer.

During the evaluation, one of the staff attended an MSA seminar. He came away impressed with the system, but felt it was too high-powered for Riley's needs.

"There just seemed no point in getting more capability than we'd ever use — especially at a cost well above the special M&D cost," Henry said.

Once he decided to try G/L Plus, the manager spent three days at an introductory training session on the package's features. In October or November, the programs were compiled here and the Riley crew began testing with on-site help from M&D.

### Mixed Blessing

One of the features that clearly impressed Henry is the Translator program that front-ends the actual ledger processing logic, converting available files into formats acceptable to G/L Plus. This meant output from existing systems — MSA's payroll package, for example — could be used "as is."

Henry noted the M&D system is "very flexible" but said that is a mixed blessing; it requires users to be very conversant with the system and with accounting to make the system work the way they want. "It can't just be picked up one day and used the next," he realized.

### Global Approach

He liked the G/L Plus approach to file creation with features the vendor calls High-Volume Add, High-Volume Change and High-Volume Delete. These permit global modifications to the file with single transactions, he noted.

And the three levels of report writer within the package also impressed the manager. The high-level report system supports consolidations, period balance sheets, profit-and-loss statements and other corporate-level documentation.

Since the old ex-1401 system could handle only one corporation at a time, this has given Riley the opportunity to bring all the divisions under one system. But the secondary report facility also allows detailed daily and weekly posting of accounts within each division.

Finally, the auditor level report writer allows the user to get into each account and analyze it virtually any way he wants. At all three levels, individual reports can be generated by "filling in the blanks" on a single formatted coding sheet, Henry said.

### One Disappointment

The DP manager was understanding, but still disappointed, that some of the manuals needed to gain a full knowledge of the system are not yet available. They're not really late, he admitted: "We knew that as an early user, we'd have this problem. And even now we have enough documentation to make the system work."

Beyond that, the company has sent two more staffers to an advanced features class and, when last contacted, was just about to close out the old fiscal year and start up the new, all under G/L Plus.

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## *Report Points to I/O Interface*

# GAO: Vendors Not Reliable in Standards Effort

**By E. Drake Lundell Jr.**
CW Staff

WASHINGTON, D.C. – The delays in developing an I/O channel interface standard provide a case study that shows why the government should not rely on commercial firms for the development of standards, a "restricted" General Accounting Office (GAO) report on problems in the DP standards program indicated.

The need for a common I/O interface was recognized in the government in the early 1960s, the draft report said, and in 1969 a GAO study estimated that the government could save more than $100 million yearly if such a standard existed.

However, most work on the standard was left to commercial firms, which were dominated at that time by the large mainframe makers — and those manufacturers had little interest in developing such a standard, the report claimed.

The American National Standards Institute (Ansi) Committee X3 established a subcommittee to develop such a standard and work began in March 1967. "But after 20 months and 15 meetings, the only product developed was a recommendation that a permanent committee be established," the report noted.

That recommendation was adopted and the committee formally met for the first time in February of 1969. "During the next seven years, the activities of this technical committee, now known as X3T9, centered on monitoring and complicating the efforts of the [International Standards Organization (ISO)] to develop an international interface standard," the report charged.

### Proposal Volleyed

As early as 1961 the international group had recognized the need for standards in this area, and in 1969 the Japanese submitted a formal proposal that was adapted from the design of the IBM I/O interface, according to the GAO report.

At the time of the proposal, eight members of the 11 on X3T9 represented computer mainframers, and that group was given the responsibility of formulating the U.S. response to the Japanese proposal.

The group contended the proposal lacked "sufficient technical detail," which caused the Japanese to offer a more detailed plan in 1970. The U.S. group did not take a pro or con stand on the new proposal, but made several suggestions for additions to it.

The ISO group working on the problem adopted those recommendations and in 1972 asked all member countries to submit a channel interface standard that met them.

Japan was again the only country to respond, offering a third proposal in 1972, but "in June 1973, X3T9 declined to submit any technical evaluation of this third proposal because it believed support for an I/O channel interface standard was diminishing," the GAO report pointed out.

However, 16 months later, Ansi told the committee to answer and it provided technical comments on the third Japanese proposal.

Japan responded in 1975 with a fourth proposal incorporating the requested changes. The U.S. group then submitted more comments, "but said that [it] did not imply acceptance of the proposal even if its recommendations were incorporated," GAO noted.

### Opposition Decision

Next the U.S. led a move to, in effect, table the Japanese proposal and an ad hoc group was set up to clarify the proposal and incorporate all the recommendations.

But in October 1976, X3T9 told the international body it "was taking a negative position on the Japanese proposal because it was far too complex, attempted to satisfy too broad a range of requirements and would be very difficult to implement, interpret and maintain.

"X3T9 also stated that much of the complexity was the result of its previous comments and recommendations," the report noted.

"The Japanese . . . officially expressed regret . . . that its proposal was unacceptable and chided those who contributed vigorously to its complexity and then opposed the result as 'far too complex,' " the study found.

### Goals Not Shared

Therefore, the GAO concluded, "although the explicit charter of X3T9 was to develop an interface standard, the history of this effort shows that such committee objectives are not always shared by some of the participants.

Rather than working to develop the standard, the members of the committee from the mainframe makers "sent employees to X3T9 in order to vote against any interface standard," the GAO added.

Because of this and the policies of Ansi that permit it, the government "has an increased responsibility, not only as a federal user of computer technology but also as a representative of the general public, to take unilateral action when its and the public's best interests are not being served," the GAO said.

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# NSA Forced Encryption Standard, Critic Says

By Brad Schultz
CW Staff

PALO ALTO, Calif. — The National Bureau of Standards (NBS) ignored criticism of its IBM-developed Data Encryption Standard (DES) because of influence from the intelligence community, a Stanford University professor here has charged.

Prof. Martin Hellman claimed that the NBS invited comments on the standard when it was first proposed, but ignored the critical response of Hellman and colleagues because of pressure exerted by the National Security Agency (NSA).

However, NBS spokesman Dennis Branstad — a former NSA employee — has said that Hellman's argument was taken into account, but was found by NBS to be derived from invalid assumptions.

Basically, Hellman argued that a machine can be built with existing technology to cost-effectively break DES [CW, Dec. 5].

This argument is predicated on the standard's 56-bit keylength that sets the number of distinct key possibilities at $2^{56}$ or about 72 quadrillion.

Hellman's envisioned machine would employ a "brute force" attack, exhaustively trying possibilities until the key were found to decipher the target data.

The machine can be built of parts now costing $20 million, on the average reaching a solution within 12 hours at a present cost of $5,000, according to Hellman, who has predicted that declining hardware costs will reduce these figures within 10 years to $200,000 and $50, respectively. These dollar estimates are accurate to a factor 10, he said.

Hellman and Stanford colleague Whitfield Diffie have indicated that no organization could afford to build a machine capable of breaking DES if its keylength were 128 or 256 bits, entailing a much greater number of distinct key possibilities to search.

Branstad has countered that "the Data Encryption Standard meets all of the requirements of the federal standard that [NBS] originally set out for . . . it provides more than adequate security in all of the applications that [NBS] can possibly find."

Hellman has said his machine would be comprised of one million parallel search chips, each testing key possibilities at the rate of one per microsecond; but Branstad told *Computerworld* that such a machine cannot be built, because chips cannot be made to match the performance Hellman requires.

However, Hellman has pointed out that this NBS position maintained by Branstad presumes that at most 1000 parallel search chips can be used, testing key possibilities at the rate of one every 40 microseconds.

Hellman claims the intelligence community can afford to built the "brute force" machine and employ it to clandestinely monitor data traffic encrypted in conformity with DES.

He asserted that NBS ignored his criticism "because it had been infiltrated by the ... [NSA]."

"NSA is the American code-making and code-breaking intelligence agency and is reputed to have a larger budget than the Central Intelligence Agency," he said. "As such, it is schizophrenic — trying to give our military and diplomatic corps the best possible codes, but trying to keep them from other countries. It would therefore resist a publicly available cipher that it cannot break."

Branstad told CW that charging NBS with NSA infiltration is comparable to charging Harvard Univeristy with infiltrating Stanford. Both Hellman and Bransted have said that, as NBS began to concern itself with cryptological matters, it was inevitable that some NSA personnel, such as Branstad, would be motivated to seek NBS employment.

### DES Products Available

To date several vendors have introduced hardware and software DES product lines, including IBM [CW, Dec. 12], Motorola Corp. [CW, Jan. 9] and Rockwell International. Branstad said that Itel Corp.'s encryption hardware has just been validated by NBS and Fairchild Semiconductor has confirmed that it will soon follow with its line.

Branstad said he considers encryption the best-known data protection methodology.

Hellman has indicated that dissemination of these products enhances the vulnerability of its users to clandestine monitoring by large corporations and government agencies — not necessarily from within the United States.

"We understand that there is a tradeoff between the military and civilian needs in this matter, but are alarmed that one of the interested parties (NSA) seems to have made the decision as to whose needs take precedence. That is a dangerous manner of government," he said.

## *What Is NSA?*

FORT GEORGE G. MEADE, Md. — The National Security Agency (NSA) here was established in 1952 to be the national authority for all United States communications security activities and is an affiliate of the Department of Defense, according to a brochure furnished by the agency.

In 1972 the Central Security Service was established to provide a more centralized cryptologic organization under the NSA's director; since then, the full name has been National Security Agency/-Central Security Service (NSA/-CSS), the brochure noted.

NSA/CSS conducts one of the federal government's leading research and development efforts in specialized communications equipment, with past breakthroughs including the first large-scale computer, the firm solid-state computer and certain applications of high-density storage technology.

# CDC Institutes Adopt CMI

MINNEAPOLIS — Control Data Corp. is switching to computer-managed instruction (CMI) in its 13 domestic Control Data Institute to improve DP instruction for students.

CMI is expected to give teachers "twice as much time to spend with individual students," according to David F. Henault, general manager of the institutes.

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## *IEEE Investigating Itar*

# Regulations Feared Curbing News of DP Work

**By Brad Schultz**
CW Staff

WASHINGTON, D.C. — Several computer scientists have joined with technicians from other disciplines to protest a set of federal regulations they feel could effectively bar them from publishing or discussing their work.

The federal government has interpreted the International Traffic in Arms Regulations (Itar) as prohibiting the communication of certain unclassified, nonproprietary data through such means as professional papers or even informal discussions if that data is thereby accessible to foreign nationals, the scientists claim.

The Institute for Electrical and Electronics Engineers (IEEE) is now investigating the charges, and with help from legal counsel is working to develop a legal interpretation of liability, according to spokeswoman Betty Stillman.

### DES Sparked Protest

The protest was started in the computing world by several critics of the Data Encryption Standard (DES) developed by IBM and adopted by the National Bureau of Standards [CW, Dec. 5].

These critics were alarmed by a letter sent to IEEE by an employee of the National Security Agency (NSA) — the federal communications security authority — stating that they were subject to arrest under Itar if they read papers critical of DES at a symposium sponsored by IEEE's Information Theory Group.

Obtaining defense counsel in anticipation of being prosecuted, the scientists read their papers anyway. The NSA has so far declined any comment on the matter beyond disavowing association with its employee's action, and no prosecution has ensued.

Prior to its symposium last fall, the Information Theory Group appointed a subcommittee to investigate the letter-writer's veracity and motivation.

Last month the subcommittee's chairman, University of Hawaii Prof. David Slepian, conveyed its findings to IEEE President Ivan Getting. The letter was apparently the action of an "isolated individual," but Itar does seem an "unconstitutional" threat to engineers' civil liberties, the subcommittee told Getting.

The group urged further study by IEEE legal counsel in an effort to decide how the organization should respond.

IEEEE is fat from reaching any conclusions in its study, Getting told *Computerworld*, because "it's too complex a problem" However, the institute has advised its concerned members to show "caution and good sense" on an individual basis in dealing with their predicament.

### Three Bans

Itar is comprised of parts 121 - 128, Title 22, Code of Federal Regulations, and is administered by the Office of Munitions Control (OMC) within the State Department's Bureau of Politico-Military Affairs. Part 125, entitled "Unclassified Technical Data and Classified Information," has especially disturbed the DES critics.

This section defines three types of technical data requiring OMC approval for export: "any technology which advances the state-of-the-art or establishes a new art in an area of significant military applicability in the United States"; data pertinent to weapons categorized under Itar's U.S. Munitions List; and information designated to be classified by Itar.

Itar stipulates that communicating such data to foreign nationals "through visits abroad by American citizens (including briefings and symposia), and ... in the U.S. (including ... participation in briefings and symposia)" without OMC approval is unlawful export, subjecting violators to imprisonment and/or a fine and other sanctions, both criminal and civil.

The DES critics fear Itar can be used against them both because oral and written communication of their dissent could be construed by OMC as illicit export of technical data advancing the state of a strategically important art and also because they work in the area of cryptology, an area concered with devices categorized under the Munitions List as "auxiliary military equipment."

They claim they might be barred from speaking at symposia since foreign nationals might be in the audience.

However, a U.S. Customs Service spokesman indicated that Itar prosecutions in the computing world have so far been confined to cases of surreptitious hardware sales behind the Iron Curtain, rather than illicit data exports. Customs normally investigates possible Itar violations, usually on OMC's recommendation.

### Another Warning

A second IEEEE group, the Aerospace and Electronic Systems Society (AESS), is also alarmed about Itar and is also pressing for legal clarification and direction on the matter from IEEE as a whole.

An article indicating the "potential severity of the problem for IEEE members" was published in AESS' Novem-

*(Continued on Page 8)*

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# Eclipse M/600 Continues Trend to Big Minis

*(Continued from Page 1)*

ning under the firm's Advanced Operating System (AOS) can move to the M/600 without modification, while programs from other Eclipse and Nova systems are compatible at the object mode level, the spokesman said.

The company is aiming the M/600 in part at users looking for ways to offload their mainframes rather than upgrading.

### I/O Management

Several features of the M/600 differentiate it from previous Eclipse systems. For one, there are three levels of I/O management designed to cope with the bottlenecks that could occur when a large number of users access the system, the spokesman said. The M/600 accommodates up to 64 users, he added.

The Burst Multiplexer Channel, described as a direct communications pathway between main memory and high-speed disk systems, features an aggregate data transfer rate of 10M byte/sec. Since users can attach up to eight controllers to the system, the M/600 can potentially accommodate up to 6G bytes of storage, DG said.

The second level of I/O control consists of the standard data channel which handles communications between the CPU and medium-speed peripheral equipment. The standard channel also serves as an interface between the CPU and the Input/Output Processor (IOP) which handles low-speed devices.

The IOP is actually an Eclipse S/130 system with 64K bytes of its own local memory, the spokesman noted. It offloads the CPU by buffering low-speed input, performing error checking and transmitting the data to the CPU "one logical record at a time."

The M/600 CPU incorporates the standard microprogrammed Eclipse instruction set with some extensions for business and scientific applications, according to the spokesman. The extensions for business, for example, include a character instruction set and a decimal/edit set with console functions said to aid programmers in tracing and debugging.

Scientific extensions allow the system to handle floating point and aggregate operations such as exponentiation, logarithms and trigonometric functions. Both single-word and double-word instructions are used.

### Memory Management

A memory management technique called Demand-Paged Memory reportedly divides each user's memory space into 2K-byte pages and allocates active pages to main memory; nonactive pages are kept on disk.

The facility, which works with an AOS page replacement algorithm resident in the executive, predicts what pages will be needed by any given user and moves those pages to main memory, the spokesman explained.

Information on page usage is maintained in hardware. This information is used by the executive to determine the mix of pages that must be available, he added.

Up to 1M byte of error-correcting MOS memory is available on the M/600 while core memory is expandable to 512K bytes. The MOS memory with the system has read/write cycles of 500 and 700 nsec respectively, while core has an 800 nsec cycle time.

The M/600 communicates with other systems via RJE 80 and Hasp II emulation software packages which are supported by synchronous line handlers. Up to 15 of the M/600 systems can be interconnected by a Multiprocessor Communications Adapter, DG said.

Languages availabel on the M/600 include Fortran IV, Fortran 5, extended Basic, DG/L — a system programming language — and the recently announced PL/I. The firm "will offer Cobol" in time, the spokesman said.

The company also redesigned the packaging of the system for easier maintenance. Printed circuit boards mounted vertically and clustered by function are contained in a card frame over an air-cooling blower system.

An M/600 with 32K bytes of core, 96M bytes of disk, a 1,600 bit/in. magnetic tape unit, 60 char/sec Dasher terminal printer, 300 line/min printer, eight asynchronous ports, a 1,200/2,400 bit/sec synchronous line interface, the AOS operating system, PL/I, Fortran IV, Fortran 5, Basic and RJE 80 costs $164,100.

A larger system with 512K bytes of MOS memory, four 190M-bytes disks, two 2M-byte fixed-head disks, two 1,600 bit/in. magnetic tapes, a 600 line/min printer. a 600 card/min card reader, 60 char/sec printer console, 32 asynchronous ports, two high-speed synchronous line interfaces, AOS, PL/I, Fortran IV and 5, Basic, DG/L and RJE 80 costs $325,800.

Systems will be ready for delivery in April, DG said from its headquarters at Rte. 9, Westboro, Mass. 01581.

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# Itar Seen Curbing DP News

*(Continued from Page 7)*

ber newsletter. The author, David K. Barton, noted that one of his associates wrote an unclassified "basic physics" paper on reflection of microwaves from the earth's surface that was disapproved by OMC as "not in the furtherance of the security of the United States."

In London to prepare for a joint symposium of IEEE and its UK counterpart, the Institution of Electrical Engineers, Barton was surprised by the disapproval and soon learned of Itar's nature from discussion with the U.S. embassy's scientific officer.

In his article, Barton pointed out that "conversations with foreign nationals at IEEE conferences here and abroad are made subject to the provisions of Itar."

A consulting scientist for a major U.S. defense contractor and associate editor of AESS' *Radar* magazine, Barton told AESS "there remains a threat of legal sanctions against anyone who enters into informal discussions within the field of radar or related propagation and physical principles at an IEEE conference here or abroad.

"All of us are aware of restrictions on discussing classified data or company proprietary data, but there is no guidance available on unclassified data which has not been cleared specifically by a government agency for 'public release,' " he said.

Barton does not "understand how we can hold meetings and expose our members to legal sanctions without obtaining a more relaxed interpretation of these regulations." He predicted that "if IEEE doesn't face up to it, the constraints will obviously become tighter rather than looser."

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## *Private-Line Pricing at Stake*

# U.S. to Hold Out for Flat Rates at April CCITT

**By Edith Holmes**
CW Staff

WASHINGTON, D.C. — The U.S. will hold out for the continuation of that flat-rate pricing for leased private lines when it meets with the rest of the world at the spring conference of the Consultative Committee on International Telephone and Telegraph (CCITT).

Hammered out during hot debate between U.S. international carriers and multinational DP companies at a recent meeting here, the position to be presented in Geneva in late April seeks to answer European and Japanese efforts. To end flat monthly rental rates for leased communications circuits.

The Italian government and British Cable and Wireless Ltd. (C&W) have asked the CCITT to study the pricing of leased circuits with a view toward making the rates for private lines dependent on the number of messages sent over them. C&W also hinted at pricing the lines according to speeds [CW, Dec. 26-Jan. 2].

The U.S. acknowledged the concerns expressed by the Italian government and by C&W, but pointed out that the kind of study they recommend "may ultimately have a substantial impact on the current worldwide rate structure."

### Unequal Burdens

In an effort to define the study, the U.S. draft noted that a flat rate for a private communications line is effectively the charge for the maximum volume of information that can be transmitted over the circuit.

"If administrations were to replace flat-rate charging with volume-sensitive rates for each speed or service, some customers might pay less while others might pay more."

"Volume or duration charging may not safeguard an administration's revenues because the present method already assures an administration of fixed income," the draft said.

Revisions to the current rate structure should be weighed against the impacts on revenues, on potential compatibility problems and costs facing leased circuit customers and on public service networks, including emerging pubic data transmission services, the U.S. argued.

### Asks Misuse Documentation

Picking up on a concern voiced by C&W, the U.S. draft stated "It appears that some administrations believe that leased circuits may have been misused by customers and are therefore suggesting volume-sensitive pricing as a means of controlling the use" of private lines.

The U.S. noted its own international carriers have tariffs and regulations prohibiting such ordinary message switching by DP customers and asked that these allegations be proved.

If misuse is to be studied, the U.S. said, consideration should be given to the current prohibitions and safeguards used by the carriers and the DP firms to prohibit unauthorized communications services.

The U.S. wants to have instances of misuse documented; it also wants to know how significant these are in the context of all the traffic carried by each country's communications lines.

### Other Efforts

The Association of Data Processing Service Organizations (Adapso) has promised to submit an additional statement to the CCITT explaining the safeguards its members employ to prevent third-party traffic on domestic and international leased circuits.

The Computer and Business Equipment Manufacturers Association (Cbema) will submit a position paper in Geneva detailing why transparent communications lines are essential to business and government interests.

Members of the U.S. CCITT National Committee have argued that the privacy of messages and data sent over communications circuits cannot be maintained if the pricing of the lines is volume-sensitive. That committee plans to send its views to Europe and Japan.

## NAC's Frank Named Fellow by IEEE Board

GREAT NECK, N.Y. — Dr. Howard Frank, president of Network Analysis Corp. (NAC), has been elected a fellow of the Institute of Electrical and Electronic Engineers (IEEE) by that organization's board of directors.

The IEEE board cited Frank for his contributions to large-scale network design and analysis.

Frank is a co-founder of NAC and former special consultant in the executive office of the President.

## Security Seminar Set

ORLANDO, Fla. — Data Security Workshops, Inc. will sponsor the 19th International Operational Data Security Workshop at the Hilton Inn Gateway here at Disney World on Feb. 20-22.

Fee for the workshop is $480.

More information is available from Robert J. Wilk, President, Operation Data Security Corp., 6 Swarthmore Lane, Dix Hills, N.Y. 11946.

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## *Wasted Dollars on DP Gear Seen Partly Buyers' Fault*

BOSTON — "If purchasing managers bought industrial equipment, like forklifts, the way they buy computers, they'd be run out of town on a rail," according to Dr. Richard Levin of the University of North Carolina.

Levin, a professor of management, said companies buy systems costing millions of dollars and then let them sit virtually idle.

Quoted in *Purchasing* magazine, Levin said buyers don't have to become DP experts to make intelligent decisions on computer equipment. "Just learn enough to sift out the smoke when your company's computer guy wants to buy some new gadget," he said.

Often, Leven said, DP people don't want to work with the purchasing department "regardless of how much money it will save." They "just don't consider it creative work," he added.

Purchasing managers can fight such resistance, he said, by pointing out to top management that the company computer is not being fully utilized and by having someone on their staff who understands computers.

"Good things happen if a computer operation has to be cost-effective," Levin said.

# N.Y. City Makes Jobs In DP More Attractive

**By Tim Scannell**
CW Staff

NEW YORK — City officials here who have been unsuccessful in filling some 128 DP positions because Civil Service employment has not been competitive with private-sector DP jobs have solved the problem by raising starting salaries and combining job classifications to permit more rapid advancement.

The reorganization included a provision for raising the rank and pay of DP employees without requiring promotional exams — a concept dubbed "broadbanding."

The broadbanding policy was introduced to help alleviate an employment problem that existed within the Human Resources Administration (HRA), a spokesman said. It takes the city months to recruit and hire qualified computer programmers and analysts because of governmental red tape, putting the city at a "distinct disadvantage" in the highly competitive DP market, Rep. Frederick Richmond (D-Brooklyn) said.

Richmond pointed out that despite a four-month advertising campaign costing the city $29,122, the HRA was able to fill only 17 out of 145 positions that were available. Seventy-six of those offered were computer analyst and programmer positions that pay an average of $18,500 per year plus fringe benefits and 69 were clerk positions paying approximately $12,000 a year, a spokesman said.

### Titles Condensed

City Personnel Director Thomas Roche feels that broadbanding should help to eliminate the problems faced in recruiting professional people. "We've also condensed 48 titles to 13, making them more flexible and have increased the starting salaries for many of the programmers and computer specialists," he explained. "In light of what we've just recently done, we are now competitive and comparable with the private sector," he said.

One critic of Roche's plan is Alfred Engel, the executive director of the Civil Service Merit Council. Engel is concerned that the new rules permitting city agencies to conduct nonwritten exams might lead to the appointment of political favorites. These rules do not "forbid political activity on the part of commissioners and others who give examinations," he contended.

Roche, however, disagreed with Engel, saying, "There is no such thing as political favorites because all we've done is reduce the number of job titles and put them all into the competitive classification. We are now starting to move and develop tests so that people will fill available positions from competitive Civil Service lists," he claimed.

"Just recently, in relation to what we've done with new titles and salary levels ... the Financial Information Systems Agency (Fisa), which is responsible for running our major computer-based operations, sent in a request to hire about 15 or 20 top-level, technical computer people," Roche said The City Personnel Department has subsequently approved that request.

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# Memorex vs. IBM Opens in San Francisco

## • *'IBM Monopolized'*

**By Molly Upton**
CW Staff

SAN FRANCISCO — Memorex Corp. and IBM have squared off against each other in U.S. District Court here for the trial of the $340 million antitrust suit Memorex filed against IBM in 1973.

Memorex charges that from 1969 to 1973 IBM intentionally monopolized five relevant markets including the general-purpose system area and four sectors in the plug-compatible manufacturer (PCM) area — disk drives, disk controllers, communications controllers and disk packs, according to Memorex attorney John Endicott of Gibson, Dunn & Crutcher.

Through various pricing and product manipulations, including the power to control prices, IBM was successful in undermining the viability of Memorex in the eyes of the investment community, thus cutting off its lifeline to needed capital, he said in his opening argument.

Memorex, as well as other PCMs, was heavily capital-dependent because of the market's lease orientation — a trait nurtured by IBM, he said.

Memorex seeks damages of $340 million, including profits the firm might have made had not IBM's actions interfered with its business, Endicott stated.

### Alleged IBM Ploys

Memorex listed the IBM ploys that were intended to exclude and succeeded in excluding "from the market any competitor who threatened to become anything more than an insignificant participant in the market." These included price balancing, manipulating its own product prices and making "unnecessary" product changes and tying in products, Endicott said.

Further, he said he will show that IBM not only had the power to control PCM prices, but carefully calculated at what product prices those firms could not survive — the "death" level mentioned in IBM documents.

"IBM took actions that unnecessarily excluded competition from the marketplace. [It] used what would otherwise be lawful practices to accomplish such exclusion," Endicott said, mindful of the reasoning of the appeals court's decision ordering Greyhound Computer Corp.'s antitrust suit against IBM back to trial [CW, Aug. 29].

### Memorex Product Plan

Memorex's product progression from media to plug-compatible products to mainframes was planned to build the firm to the point where it was a systems manufacturer, Endicott stated. In that area, he said, Memorex would not need to be compatible with IBM and therefore would not be so vulnerable to IBM's actions. Memorex's plan was to raise the necessary capital from Wall Street.

Focusing on the need for capital, he stated that the leasing nature of the PCM arena constituted a barrier to entry of competition into the marketplace. He showed the jury documents that indicated IBM realized this.

Why was IBM concerned about the PCMs and Memorex in particular? Endicott showed a 1969 IBM document estimating Memorex could be a $200 million company by 1972 — just about triple the size of the firm when the report was prepared.

In June 1970, the IBM peripherals task force calculated PCMs had 4% of the leased 2314-type disk drives and could have 30% by 1976.

IBM, Endicott said, constructed a computer model of Memorex in mid-1970 that "identifed the vulnerabilities of Memorex as a competitor and the acts that IBM could take that would exploit those vulnerabilities.

IBM, rather than building better mousetraps or reducing the prices of its installed base of 2314 disk drives, brought out the 2319A and -B. These products featured altered interfaces — part of the controller was put into the drive. IBM then offered an Extended Term Plan and Fixed-Term Plan — long-term leases with discounts available on certain product categories.

## • *'Memorex Poorly Run'*

**By Molly Upton**
CW Staff

SAN FRANCISCO — "Memorex wants to sell you a theory of competition which says competition is fine so long as you are small, but if you reach a certain size you may no longer compete," IBM lead attorney Patrick Lynch told the jury here at the opening of the Memorex vs. IBM antitrust trial.

Memorex will argue that "you must stand still and let the other guy punch you out." But, IBM counsel contended, "that is not the rule of competition."

IBM is a big, successful corporation today because it "took a gamble" and because it "got in on the ground floor" of the computer industry, according to Lynch.

He contended that Memorex has not been as successful because the firm was mismanaged for the personal gain of a few insiders, not because of any action by IBM.

In fact, he argued, Memorex Corp. filed its suit against IBM, to recoup losses caused by its management's ineptitude.

Memorex's loss of credibility in the view of the investment community was the company's own doing and resulted from the firm's misstatement of its finances concerning its transactions of equipment to its subsidiary, Independent Leasing Co. (ILC), Lynch, an attorney with O'Melveny and Myers, said in his opening statement.

### 'Insiders' Seen Favored

In addition, Memorex officers managed the firm to benefit themselves and some other inside investors, he argued. Rather than obtaining capital from a public offering, for which it had the "golden opportunity," Memorex borrowed money. A public offering would have diluted the value of the insiders' stock, he continued.

Memorex "intentionally put itself in the situation where it absolutely had to borrow money. Then it ruined its reputation so that it couldn't possible borrow money and because of that fact, in 1973, it did come upon financial problems..." Lynch told the jury.

"Memorex got itself in trouble because it tried to be too much of a high flyer. It tried not just to make a lot of money, it tried to break the bank and it didn't try to break the bank as a corporation, it tried to break the bank for those favorite investors who were on the inside..."Lynch contended.

"We submit...[the lawsuit] was not based upon damage or injury unless the injury [lies in] having to meet competition."

Lynch countered Memorex's charge of monopoly by contending that Memorex had shown remarkable growth — reaching the Fortune 500 — and that that would hardly have happened in a monopolozed industry.

Just as Memorex's problems stemmed from management, so did the improvements that occurred after the firm got rid of Laurance Spitters and put in "real live management," Lynch stated.

Lynch said he believes one of Memorex's real problems was its assumption that IBM would act as a monopolist, that it would not compete, and that Memorex planned as if it were not in a competitive environment.

Regarding IBM pricing, none of the products mentioned was priced below profitability, he said.

Defining competition as "unrestrained interaction of competitive forces," Lynch told the jurors that if they find IBM has acted unlawfully and penalize it, they are imposing a restraint. "So if that [definition] is really competition, you are penalizing competition," he said.

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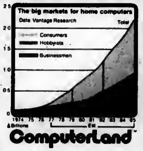

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# Users Alerted to Vendors' Negotiating Tactics

By Tim Scannell
CW Staff

WINTER PARK, Fla. — Inexperienced users faced with negotiating a computer contract should be aware of a number of common vendor ploys that can rob them of their negotiating power, according to a recent article in "Computer Negotiations Report" (CNReport).

In one ploy, the vendor's representative indicates that "as much as he would like to meet the user's demands, the matters desired by the user must be approved by 'corporate,' " a chore that is both difficult and time-consuming, the newsletter said.

Users are forced into defending their requests for various services and "if the user fails to meet the necessary burden of proof, the vendor wins," the report said.

Such techniques are used because they are effective in gaining control over negotiations, the report explained. The user is forced to waste time and professional talent justifying relatively minor points and, as a result, is "slowly worn down."

These ploys are usually defended as a standard way of doing business. The user, therefore, is duped into believing that each of his demands, no matter how small, is a deviation from normal negotiation procedures, the report said.

Vendors often promote their standard form of agreement as "the easiest, fastest and best way for the user to obtain the necessary equipment," CNReport noted. Names of companies larger than that of the negotiating user that have accepted standard contracts are given as examples in hopes that the user will be hesitant to suggest a contractual change.

Vendors' representatives might also insist that users divulge all of their needs and concessions at the beginning of an agreement, resulting in the user's loss of his "slice-at-a-time negotiating strategies" as well as giving the vendor time to "plan ways to sell or maneuver around" the user's desires, the report warned.

### User Defenses

The vendor strategy of limiting a user's involvement and powers of negotiation can, however, be dealt with effectively, the report pointed out. The first step is to recognize the ploy for what it is and "refuse to accept side letters and 'local' vendor promises in lieu of formal contractual commitments.

"If it is not part of the contract, it is not part of the deal," CNReport warned.

Because most computer acquisitions involve a great deal of money and potential risks for the user, every angle "deserves to be fully studied, negotiated and documented." Users were also advised to "refuse to negotiate if the vendor will not agree to provide the necessary senior management and legal personnel, or at least direct access to them."

Users can put vendor negotiating techniques to their advantage by remaining calm, recognizing the ploy and insisting — just like the vendor representative — upon getting clearance from "corporate," the report noted.

Further, any "concessions gained with 'corporate' or 'legal' approval will have more validity, thus improving the likelihood of appropriate contractual coverage and actual vendor performance."

Finally, CNReport stressed that a user should do his best to indicate that he "has no intention of signing, or even seriously considering, the vendor's standard form of agreement.

"Wherever the vendor's marketing representative asserts that something is covered in the standard vendor agreement, ask that he read the applicable provision without 'self-serving' explanations and then ask how the provision involved provides adequate protection to you," the report recommended.

# ABA Workshop Set for Houston

WASHINGTON, D.C. — The 1978 Telecommunications Workshop, sponsored by the Operations and Automation Division of the American Bankers Association (ABA), will be held in Houston on Feb. 12-15.

A featured speaker at the workshop will be Sen. Ernest F. Hollings (D-S.C.), who will address a general session and highlight competition in the regulatory arena.

The workshop will also include a discussion on electronic funds transfer (EFT) and an exhibit of telecommunications products and services.

Additional information on the meeting is available from Connie Williams, ABA, 1120 Connecticut Ave. N.W., Washington, D.C. 20036.

# ACM, IEEE Set Up Eckert-Mauchly Prize

NEW YORK — The Eckert-Mauchly Award has been established by the Association for Computing Machinery (ACM) in union with the Institute of Electrical and Electronics Engineers (IEEE) to honor J. Presper Eckert and John W. Mauchly, pioneers in the design of the Univac I computer.

The award, consisting of a certificate and $1,000 in cash, will be given for contributions to computer and digital systems architectures

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# Burroughs Brings Suit In Knoxville Imbroglio

By **Jeffry Beeler**
CW Staff

KNOXVILLE, Tenn. — Burroughs Corp. has brought suit against the City of Knoxville and 22 of its government administrators for alleged breaches of a contract the company contends exists between it and the city.

In complaints filed Jan. 4 in Knox County chancery court here, Burroughs charged the city violated its procurement code when it asked the city council and later the Mayor's Advisory Committee on Data Processing to review a bid for a B2810 computer system.

Burroughs claimed the requests for review were illegal because the city's DP manager had already selected the B2810 during the course of competitive bidding last fall [CW, Dec. 19].

Under provisions of the local procurement code, a valid contract existed between the city and Burroughs when the firm was formally notified of the DP manager's selection and later acknowledged the notification, Burroughs contended.

The firm also charged that a report in which the committee compared the estimated costs of the B2810 and competing systems contained over $673,000 in errors detrimental to Burroughs' hardware proposal. Attorneys for the company argued that the report, which the committee presented at a Dec. 13 council meeting, led to the council's subsequent decision to scrap the Burroughs bid and try to settle a longstanding contract dispute with Honeywell Information Systems, Inc., the city's current computer vendor.

Defendants in the suit include Mayor Randy Tyree, municipal DP director James Ryan, 12 past and newly elected city council members and all eight members of the Mayor's Advisory Committee on Data Processing.

On the same day it filed the suit, Burroughs also applied for and was granted a temporary restraining order barring the city from negotiating a new computer contract with HIS. That order was disolved by the court less than two days later.

The case is tentatively slated to go to court on April 24, according to Philip Durand, Burroughs' chief attorney in the suit.

### Burroughs' Account

In a pretrial document listing its complaints against the defendants, Burroughs offered an account of how the current controversy over the city's computer system began.

On Sept. 7, the brief said, Ryan wrote 16 CPU manufacturers a letter requesting bids for a system to replace the city's aging General Electric (now HIS) 437 systems, which he concluded could no longer meet the area's growing DP needs. By Oct. 5, the city had received 17 replies.

After a lengthy evaluation of all the responses, Tyree informed Burroughs in a letter dated Oct. 27 its bid had been selected.

During the first two weeks of November, however, members of the advisory committee informed members of the city council by telephone that a used computer at the Knoxville Utilities Board (KUB) was for sale and that the agreement with Burroughs "was not in the best interests of the city," the brief said. Although the KUB wrote a Nov. 7 letter denying any intention to sell its IBM 360/40, that information did not prevent the committee from reiterating its claim in a letter dated Nov. 10 and in a council meeting five days later.

Some observers here have cited the KUB incident as evidence the committee planned to undermine the bid for the Burroughs equipment and replace it with an order for an IBM system.

Although the claims about the KUB computer were eventually disproven, they created enough confusion among council members that in mid-November the council asked for the committee's help in selecting the city's new computer system, Burroughs said in its brief. That request signaled the committee's first direct involvement in the selection process.

Finally, at the Dec. 13 council meeting, committee chairman Tom Sudman presented a financial analysis which he claimed proved the proposed Burroughs system would cost the city almost $88,000 more than the existing HIS system. Sudman's claim disputed the findings of the municipal DP staff, which had concluded that the Burroughs system was the cheapest response to the city's request for proposals.

Sudman refused to explain how he derived his figures, and Ryan later presented a document that itemized numerous alleged errors in the chairman's cost estimates. Nevertheless, the city council accepted Sudman's recommendations by a 6-2 vote and, acting on the advice of the city's legal staff, directed Tyree to reject all bids and keep the 437 system.

In its suit, Burroughs contended that it and the city had already formed a valid contract as defined by Section 29A-108 of the municipal procurement code, which defines a contract in part as "all types of agreements, grants and orders for the procurement or disposal of supplies, services, construction, insurance or any other item."

Thus, the suit declared, the city council broke the law when it solicited the committee's help in selecting a new computer system. Burroughs also pronounced as illegal the council's decision to reject all hardware bids and resume negotiations with HIS.

In other charges, Burroughs argued that Tyree and Ryan lacked the legal authority to seek council's approval for the B2810 after they informed Burroughs its system had been selected.

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# Dartmouth Student Job Seekers Turn to T/S

HANOVER, N.H. — The Career and Employment Services here at Dartmouth College has utilized the computer to develop a different approach to the standard classified advertisement for jobs.

As of last fall, Dartmouth students gained computer assistance in their job-hunting efforts thanks to a computer program known as Dart-Job.

By listing odd and part-time jobs and full-time leave-term employment opportunities both at Dartmouth and in the surrounding community, the program presents the student with an accessible, up-to-date body of information.

No computer background is needed to use Dart-Job; the student merely calls up the program on one of the college's 300 terminals and, in a "conversational" exchange with Dartmouth's interactive computing system, asks for the particular type of job desired.

The computer then prints out all available jobs of that type, describing each individual job, its requirements, the period of employment, the hours per week, the salary and the address and telephone number of the contact person.

Conversely, the program offers the employer the opportunity to reach a large percentage of the student body. Any college or local employer can list a job opening with the service at no cost by either filling out an advertisement form and sending it to the Career and Employeemnt Services or calling and asking to have the job listed. Listings are updated daily.

### Caters to Interests

Before Dart-Job, students had more difficulty obtaining information on available jobs. In the past, some were listed in Career and Employment Services, and students could browse through books of listings.

But the books were cumbersome and difficult to organize and update. Information on many other jobs was available to students only by making the rounds of all potential employers in the community.

Now a student can quickly get a full list of only the types of jobs that interest him. For example, the computer will print out the various categories of odd jobs available. The student then selects a category (office work, physical labor, baby-sitter, etc) and the computer prints out all available jobs in that category. The student then is free to contact the employer directly.

Employment information is available for the 20 hours per day that the Kiewit Center operates. Dartmouth's timesharing system is based on a Honeywell 66/40 system.

The program was researched and designed by Ginny Darrah of Norwich, Vt., with the assistance of Eve Pratt of Longmeadow, Mass., and Carl Worrell of Montreal, Canada, both members of Dartmouth's class of 1979.

## Auerbach Lauded By Israeli School

PHILADELPHIA — An Israeli academic, technical and religious center has named its computer school after an American consultant and publisher.

Boys Town Jerusalem named its school the Isaac L. Auerbach Institute of Computer Technology in tribute to Auerbach's contributions as the school's originator.

Boys Town Jerusalem "provides a comprehensive program of academic, technical and religious studies for over 1,300 talented, needy youths from all parts of Israel," the American Friends of Boys Town Jerusalem said.

Established two years ago under Auerbach's direction, the computer school has already hosted an all-Israeli conference on secondary level computer instruction that was attended by Israel's leading computer authorities, the organization noted.

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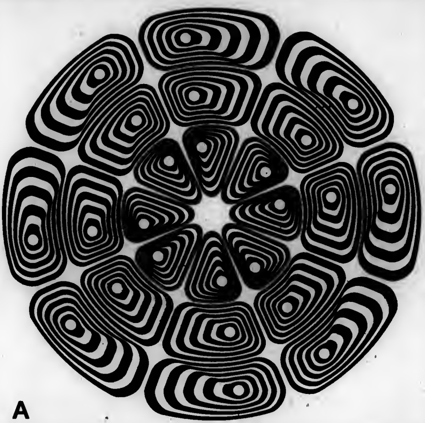


# Computer Artist Creates 'Spieforms' Exploring Mandala Theme

**By Jeffry Beeler**
CW Staff

NASHVILLE, Tenn. — Like most other artists, Kerry Jones is continually experimenting with new artistic styles. But Jones works with computer plotters and printout sheets instead of canvas and brushes.

In his latest creative phase, he has developed a kind of computer-assisted Op Art in which simple, geometric figures are repeatedly transformed to form complex, highly symmetrical designs. Jones, a computer programmer by training, calls his designs "Spieforms" after a drawing he once saw in a brochure published by the Society of Photo-Optical Instrumentation Engineers (Spie).

Typical of the genre is a work entitled "Spies Mandala" — a name that recalls the divided circle that in Hinduism and Buddhism symbolizes the universe. As its name suggests, the drawing consists basically of three concentric rings, each formed of eight small, equally spaced circles.

## Unified Design

Around each of these 24 shapes lie nine alternately white and black concentric circles, each one more distorted than the last. Each set of deformed concentric circles is identical to every other set, creating a design that is unified and symmetrical along multiple axes.

Using "Spies Mandala" as a model, Jones has subsequently fashioned several other drawings that incorporate the same basic design as the original but differ in details that distinguish them from other members of the series.

Counting the "Spies Mandala" group, Jones thus far has created eight such series of Op Art designs, and more are contemplated in the future.

Most of the effort involved in producing a sequence of Spieforms is devoted to writing graphics programs, Jones said. After that step is completed, he keys his instructions into a computer and transfers them to magnetic tape, from which a graphics plotter generates a finished drawing.

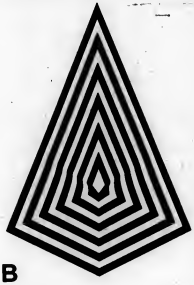
The first in a series of designs usually takes Jones about three months of intermittent labor to produce. But once he has an original drawing in hand, he can create a series of variations in just a few hours by simply changing a few parameters in his graphics program and testing the new instructions to ensure they yield the desired results.

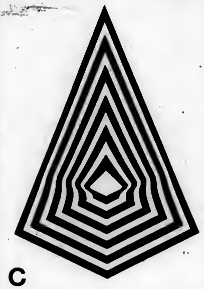
## 'Curve-Fitting Algorithms'

Jones first became interested in computer art about three years ago while working as an engineer at American Buildings Co. in Eufaula, Ala.

"They had an engineering graphics system with a couple of plotters and some graphics software for producing blueprints and shop drawings," he called, and the system was almost always available for his use.

At first, Jones only "played" with the equipment. But as his interest and expertise in using the computer as an artistic medium grew, he graduated to increasingly complex programs until he began experimenting with his own concepts.

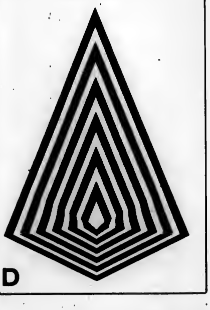


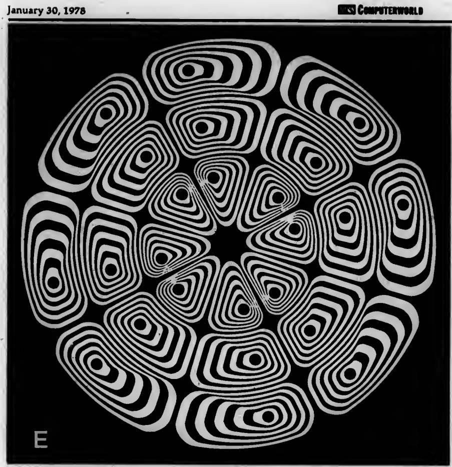


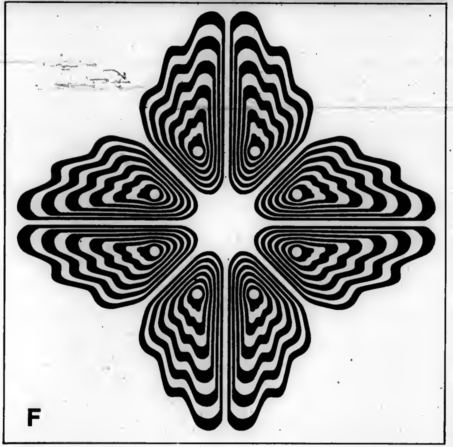
*'Spies Mandala' is shown in Figure A; Figure E is its reverse.*

*Figures B, C and D are experimental designs. All are black and white.*

*Figure F, entitled 'Nova,' is black on silver paper. Its original is reversed.*







The idea for his latest artistic style first occurred to him after he saw and later duplicated a design that a Japanese group had generated by computer. From that exercise, he derived the idea for the "curve-fitting algorithms" on which much of his later work is based.

Using the algorithms, he then wrote the necessary graphics programs and produced his first finished Spieform on two California Computer Products, Inc. plotters driven by an IBM 370/-125.

Jones recently left American Buildings to join Datapoint Corp.'s office here as a systems engineer. The move deprived him of easy access to an on-line graphics system and, temporarily at least, brought his budding career as a computer artist to a standstill.

Jones hopes the interruption will prove only brief, and he has already begun searching for a system to replace the one he lost at his previous job. "I've visited the computer center at Vanderbilt University," which is nearby, "and I was real impressed with its setup," he said.

Jones denies trying to make any serious moral or artistic statement through his work, and he discounts the influence of any formal art movement on his style. Rather, he said, he creates computer art mainly for the fun of it.

He professes to enjoy writing the programs that precede Spieform production and viewing the finished product, which he said often results in many aesthetically pleasing shapes and patterns.

*'The computer is one of the greatest toys ever made, and I always have a lot of fun using it.'*

"The computer is one of the greatest toys ever made, and I always have a lot of fun using it," he added.

Because of their complexity, works like Spies Mandala would probably prove extremely difficult to execute without the help of a computer. "I guess a very skilled draftsman might be able to duplicate it," Jones speculated, "but for someone like me, who has little or no formal art training, it would be nearly impossible to do."

Jones considers Op Art a natural medium of "artistic expression" for computers, and he expressed surprise that more contemporary artists have not adopted the machines as an aid in their work.

"Much Op Art is mathematically oriented or based on graphic patterns that repeat themselves, and it is just these areas that computers are best equipped to deal with," he pointed out.

The chief strength of using computers to create art lies in their ability to generate variations of an original design quickly and easily. In a recent set of drawings, Jones produced five variations with only minimal changes to his master program, he recalled. At other times, he has formed a series of variations automatically.

The main weakness of computers as artistic aids lies in what he bluntly called their "incredible stupidity." In programming the machines to draw complex designs or pictures, artists must be extremely thorough in their directions.

If they omit the slightest detail from their programs or fail to make explicit even the most transparent assumption, an error will probably result.

"Getting the bugs out of your programs can be a real hassle," Jones complained. "It's very frustrating sometimes."

# Editorials

## Come Now, Mr. Barr

We recently received a letter from Thomas D. Barr — IBM's top trial attorney in the U.S. vs. IBM antitrust case — that accused us of distorted coverage of the trial [CW, Jan. 16]

Usually we do not answer such attacks, feeling it is the purpose of the "Letters to the Editor" column to let others give their opinions, unanswered by us even when we disagree. However, we cannot in good conscience let Barr's letter go unanswered.

Either Barr is uninformed about the possible negotiations between the government and IBM on a settlement or else he is being cagey.

Barr noted that we reported on a meeting between Lloyd Cutler, another IBM attorney, and top Justice Department officials and that our Dec. 19 editorial criticized members of the Justice Department for failing to disclose the settlement proposal made by IBM at that time. He asked: "Did it occur to you that perhaps no such proposal was made?" But he did not deny that the meeting took place.

We have checked our sources again and reverified that the meeting did in fact occur. At that time, Cutler suggested that a special panel be set up to review an earlier IBM settlement proposal.

In only a very limited sense Barr may have been right — no new proposal may have been made since the Justice Department immediately told Cutler it was not interested in talking.

IBM clearly sent Cutler to the meeting to discuss settlement, and the clever language of the chief IBM advocate cannot hide that fact, although he did try to discredit our report.

But perhaps that is giving Barr too much credit. It is a common practice for firms negotiating settlements not to tell their trial teams that such negotiations are proceeding. After all, such knowledge might make them less effective in court.

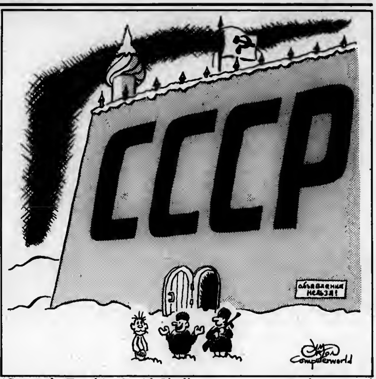
So perhaps Barr just did not know what he was talking about. Now we have a question for him: "Tom, did it occur to you that perhaps such negotiations are under way and that you just have not been told about them?"

## About CW and Family

*Computerworld*'s parent company has changed its name from Computerworld, Inc. to CW Communications/Inc.

According to Patrick J. McGovern, chairman of the board, the new name "better reflects the current status and future direction of our company," which now has five additional business publications in four countries.

CW Communications President Walter Boyd noted that in addition to *Computerworld* in the U.S., the firm publishes *Computerwoche* in West Germany, *Doto News* in Brazil, *Computer Monogement* and *Export Direction* in the UK and is a partner in publishing *Shukon Computer* in Japan.



*'Comrade Turchin, We'd Gladly Let Your Research Material Out With You — If It Existed and If It Weren't Soviet State Property . . '*

# Data Past

### Five Years Ago
### Jan. 31, 1973

WASHINGTON, D.C. — Late last week the Justice Department acknowledged that the destruction of the computerized index of documents as part of the IBM/Control Data Corp. settlement could seriously hamper the government's antitrust efforts against IBM. In a brief filed in a federal appeals court in New York, the Justice Department contended that IBM had violated agreed-upon rules in secretly negotiating to destroy the data and further, it said, this destruction was a deliberate attempt to hamper the government in its case.

— — —

WASHINGTON, D.C. — The first application for a resource-sharing or "value-added" computer/communications network was filed with the Federal Communications Commission by Packet Communications, Inc.

### Eight Years Ago
### Feb. 4, 1970

NEW YORK — IBM's "new world" of unbundled software and services was creating confusion both outside and inside IBM, Paul D. Oyer concluded after a seminar on "The True Price of Unbundling." From discussions at the meeting, it was apparent that many large IBM users had been able to wean themselves from the firm, but the future ability of the smaller user to get along with the remaining IBM support services was seriously left in doubt.

— — —

NEW YORK — Comma Corp., a nationwide maintenance organization, was established here last week to provide service to users owning their own computers or users with "mixed" computer systems. The company announced plans to offer reconditioning and reconfiguration services to clients in addition to straight maintenance.

# Letters to the Editor

### DEC Too Often Overlooked

"Technology, Actions by IBM Spur Plunge in 1977 Prices" [CW, Jan. 16] unfortunately contained a serious omission in the comparison of several computing hardware vendors. Digital Equipment Corp. machines were not included in mainframe comparisons.

For several years, DEC has been actively marketing the Decsystem-10, a large-scale time-sharing machine which has gained general market acceptance. More recently, DEC has introduced the Decsystem-20, a general-purpose mainframe capable of upward expandability. Both of these machines are being widely used in business and scientific applications. To date, over 700 machines have been installed.

These machines are providing an acceptable price-performance ratio and, when combined with DEC's Tops-10 and Tops-20 operating systems, providing adequate flexibility for almost all data processing applications.

This significant omission has been present in numerous *Computerworld* articles. Since DEC offers a competitive product, has developed sophisticated operating systems and has installed more than 700 large-scale machines, CW should feel obligated to include DEC hardware in mainframe evaluations.

Roger Lightowler
Cambridge, Mass.

### Danger of Cashless Society

In regard to "EFT Systems? No Thanks, Not Yet" [CW, Jan. 9], I find one outstanding issue concerning electronic funds transfers which to my knowledge has never been mentioned.

Very simply put, I'm concerned with the possibility of electronic cancellation/flagging of individual accounts in a true cashless society, either accidental or intentional, for whatever reasons.

As you realize, correcting such a situation can prove both time-consuming and frustrating. The temptation for a government to "lose" a person could be too much to resist. If an individuals's personal identification number were "accidentally" removed from the master file, he could easily starve to death before the situation was rectified.

Farfetched? Perhaps. However, nowhere have I read of experts recognizing this potential problem. With corruption being what it is under the human condition, don't sit there and tell yourself such a thing would never happen.

With over 250 quarter-hours of college behind me now, I don't believe I'm being overly alarmist on this issue, considering my 12 years of experience in DP and work with various levels of government and industry.

Frederick V. Plummer
Orlando, Fla.

### Ready and Waiting in Line

I was nauseated to read the article by Patrick Portway concerning EFT [CW, Jan. 9]. If consumers find it so bad, why must I stand in line to use the machines?

There must be some way Portway and his ilk can get their kicks other than sitting around thinking up ways to drive up the cost of goods and services.

Lester H. Hoyt, M.D.
Indianapolis, Ind.

### Consider 'Modus Operandi'

# Precautions Can Help Deter DP Criminals

**By Jack Stone**
**And Ida Mason**
Special to CW

The "Embezzler's Guide to the Computer" by Brandt Allan, a featured article in a recent issue of the *Harvard Business Review*, suggests that the best way to prevent a disgruntled employee from committing a computer rip-off is to understand his crooked methods and procedures, his *modus operandi*. In this column the last of four on DP crime, we have used this "guide" and our own sources to briefly examine the ways and means of computer theft.

Let's first look at some widespread misconceptions about computer crime. To begin with, it is commonly believed banks make the best targets for the culprits. In fact, computer frauds have been in no way concentrated in this industry but have been perpetrated throughout a wide variety of businesses and government agencies. Regular federal and state audits of banking insitutions may even make these firms less appealing victims of computerized larceny than other classes of institutions.

Another incorrect idea is that small and poorly managed companies are especially vulnerable to computer criminality. It's true, of course, that such companies often lack sophisticated internal controls, "failsafe" system designs and adequate management supervision, thus making them particularly tempting targets. But large corporations with seemingly adequate security also provide much incentive for mischief because of the prospects for much bigger payoffs.

Furthermore, management in large businesses and in government are less apt to detect "small" losses, which can be aggregated over long periods to form substantial hauls. There is also the remote but finite possibility of management in such organizations being directly involved in schemes to defraud, e.g., the Equity Funding career.

The hackneyed saw that "the old schemes won't work anymore" is another example of a commonly held misconception. It is not fully appreciated that today's technology often makes yesteryear's flimflam even more attractive, because of proven successes of the methodology over long periods of time. For example, the FBI trains its agents in classic embezzlement strategies — presumably arguing that this is the best way to detect and control variations on old themes.

A final mistaken notion is that the computer thief is going solely after the company's cash. Not at all! Vouchers, shipping documents, accounts receivable and inventory are often just as negotiable and usually much more difficult to trace and control than cash resources.

This conclusion was dynamically demonstrated in the case of a young college student who systematically and for long periods looted a phone company's equipment inventory by unauthorized terminal access and resold truckloads of hardware to acquire a fortune before he was turned in by one of his disgruntled employees.

## The Human Connection

Moving now from commonly accepted myths to commonly ignored truths, we should note that some disgruntled employees may already have developed embezzling schemes that may never be detected. Keep in mind that only an extremely small (considering the potential) number of computer crimes have been uncovered and that a large number of these were detected strictly by accident.

Further, the great complexity of the new technology affords many opportunities for disenchanted employees to "get even." And not only may all this be accomplished with relative ease, but often with relative impunity. Crimes against depersonalized entities like corporations and large machines, as opposed to crimes against individuals, are typically minimized or even ignored by the victims — the idea of "washing one's linen" in public is unappealing under even the best of conditions.

A final thought is that embezzlements have been especially effective in companies that employ large and constantly changing workforces. Adding the names of people never employed or neglecting to delete those who left the company is a ploy sometimes used to siphon off loose funds.

Here are some DOs and DON'Ts regarding the control of computer crimes.

- DO keep a strict accounting of computer time usage during batch operations. DON'T allow anyone access to the machine or data without knowing who the user is and who is granting authority.
- DO make a special effort to control access in the terminal-oriented environment. DON'T ever let anyone in without absolute identification.
- DO use a system of passwords with frequent changes (properly controlled, of course). DON'T let the password data-set-protect-keys float around or ever permit passwords to appear in hard copy.
- DO create temporary teams of systems people to try to penetrate security, DON'T let these teams operate in an unsupervised mode.
- DO hire and develop computer personnel as if they hold the future of your organization in their hands!

*Ida Mason, a professor of DP at Lehigh (Pa.) Community College, is currently on sabbatical doing research on women in management.*

*Letters to Stone should be addressed to him at Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.*

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### ICCP Code Supported

# Readers Criticize Saks Credit Procedure

**The Taylor Report**
**By Alan Taylor CDP**

Readers responding to a questionnaire in this column concerning Saks Fifth Avenue's credit procedure [CW, Dec. 26-Jan. 2] generally disagreed with Saks' position. Further, they expressed support for the code of the Institute for the Certification of Computer Professionals (ICCP) that stipulates that only properly substantiated data should be published.

Saks had used a fictitious balance figure of "0" on a customer's statement, leaving out information about an earlier credit balance.

Respondent Alfred S. Baker II from Chicago, a manager of software administration, could not accept Saks' excuse that the system as a whole "helped the research people." He wrote: "Any document that has a snowball's chance in hell of getting to a user should never contain fictitious data."

The procedure was condemned by all sorts of DPers — general manager of a systems house, EDP manager for an instrument company, systems analysts, programmers, controllers, instructors, senior vice-presidents, accountants, salesmen, an EDP auditor and an outside auditor. Society affiliation made no apparent difference.

### ICCP Code Situation

There was equal agreement on the relevance of the ICCP code to this situation. The code comes from a number of earlier codes and calls on professionals to restrict their statements to matters that can be properly backed up. The "0" balance figure could not be backed up, but Saks claimed there was no systems error involved. The output was, therefore, deliberate.

In the questionnaire, respondents had three choices — that a system's authorized outputs are subject to our professional codes "totally," "in part" or "not at all." Approximately sixty percent answered "totally," 40% said "in part" and only two replied "not at all." (One person argued that the codes "obviously" only applied to "questions and answers [conclusions] about DP systems.")

### Corporate vs. DP Management

A number of people brought up the employer/employee relationship. Several referred to management attitudes of "You do what I want today, and you will have a job tomorrow." Clearly, corporate management is involved along with the professional staff.

This question of joint responsibility between the two seems to be something the ICCP people should look into soon if their code of conduct is to have any weight in keeping computer output accurate. Or perhaps the ICCP does not think this is important? I would have liked to hear from it, but I didn't.

As one person said, "Situations like this raise credibility questions about DP."

The other signal that came through loud and clear was that people who were in touch with the retail situation — and many who were not — considered the use of fictitious balances as being in one way or another against the law. One systems house president from New York State cited part of the Fair Credit Billing Act [Chapter 4, Credit Billing — Section 165].

Our profession should not officially ignore situations like this.

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## Sound Familiar?

Are programmers instructed to include rip-offs in their programs? If so, what exactly is involved? Here is one person's story:

"I was DP manager for a large ... retail mass merchandiser. Its practice was to inhibit printing of credit balance statements and print a special report of credit balance accounts with totals, for the use of the credit department in case of any investigative inquiry. The policy was to drop any credit balance after the account was inactive for one year.

"It has been the practice of retailers for years to inhibit printing of credit balance statements or print a code which causes them to be selected for further action."

If you know of any similar situations, please let me know. All names will be held in confidence. Send replies to Alan Taylor, c/o Computerworld, 797 Washington St., Newton, Mass. 02160.

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# Letters to the Editor

## 'Bionic Blooper'

In a recent episode of "The Bionic Woman," a modern-day Robin Hood used a university's computer to divert funds into his hands so that he could support 38 underprivileged students, who wanted to go through college.

The head bad guy, a university official, saw the potential for the program to divert such funds and tried to steal it from Mr. Hood and Miss Bionic. Just prior to the climax of the show, Mr. Villain said "We're going to go steal that program tonight. We're going to go get the tape."

In the very next scene, the villains had broken into the computer center and taken the back off some piece of equipment and were removing the "program" with a screwdriver. After a henchman had unscrewed some piece of electronic gadgetry and the villain had slipped it into his pocket, the gang prepared to depart.

The point of all this is that stealing a computer program does not involve a screwdriver. The idea of software of any kind being represented as something as tangible as a piece of hardware that can be removed with a screwdriver is incredibly misleading.

Pansophic and many other firms in the software industry are spending a lot of money and time trying to explain to business people and others exactly what software is and what software does. I believe this show set all of our efforts back quite a few paces. I would call it a "bionic blooper."

Lee B. Mulder
Corporate Director
Advertising & Public Relations
Pansophic Systems, Inc.
Oakbrook, Ill.

## Irresponsible Advice

I read with interest "Simulated Bomb Threat Uncovers Security Holes" [CW, Dec. 26-Jan. 2], and I take exception to it.

The author stressed the need, in the event of a bomb threat to organize a team of employees to search for the "bomb."

If you have ever published a more irresponsible piece of advice, I don't remember it.

In the event of a threat of violence, remove essential documents and get the hell out! Be reminded that this is not a merit-badge test; nor is it a John Wayne movie. No organization — save perhaps the Secret Service or United States Marine Corps — has the slightest right to enlist its employees in a bomb hunt! There are qualified police units whose unpleasant job it is to handle such matters.

J. Stephen Schiavo
Arlington Va.

## India Will Compromise

In "IBM Exit From India Not Surprising" [CW, Jan. 9], the author, whose analysis of the situation is not without substance, ignored many important parameters with long-term implications.

The one common denominator for most developing countries is a desire to affect "participation" by technology-based and other foreign entities who import products into their domains. Participation not only ensures a lasting contribution, it also demonstrates a commitment on the part of outsiders who otherwise will be viewed with suspicion and considered a burden on the local economy as a result of the hard-currency export they create.

Participation based on joint ownership (with locals/nationals) or through licensing technology to nationals appears, on the surface, to be "the only way to go" for the emerging nation. Often, however, as in the case of IBM in India, an unyielding participation policy may become a case of one "cutting off one's nose to spite one's face."

Inasmuch as IBM is the unchallenged world leader in computer technology, one cannot expect to become fully competitive on today's world marketplace without either unique resources in demand (which India, for example, does not have) or the utilization of the most advanced technology — i.e. IBM's.

Even though, because of its vast population, India does not seem to need or want labor-saving devices, automation is essential for bringing product quality up to world standards. The Indians may find that even though automated cotton mills may displace a couple of million laborers, the quality and cost of cotton will improve sufficiently to enhance its place on the world market and bring about substantial increase in hard-currency income.

For those displaced, the added revenues can be used to make more public-supported jobs.

It is fair to assume that in due time IBM equipment will be sold in India again. The Indians, in spite of their wishes for participation and their anger at IBM's attempt to "dump" refurbished equipment in their country, are bound to learn the art of compromise.

Gordan Anan
Lincoln, Mass.

## Not That Many Tricks

We take exception to "Fine Print Called Vendor Trick," [CW, Dec. 19]. We are familiar with the *CNReport* and it appears that the latest issue continues the campaign to besmirch the reputations of computer dealers and leasing companies.

As in any business field, there are those few disreputable firms that discredit the industry. However, the "tricks" enumerated in the "report" are less prevalent than were implied.

I am confident that I speak for others in the computer brokerage industry in requesting that future issues of *CNReport* turn attention to positive market assistance rather than negativism.

Joan W. Johnson
President
DP Brokers
Vienna, Va.

# User, Vendor Cooperation Pays Off

**By Don Leavitt**
CW Staff

WALTHAM, Mass. — What can happen when the growth of a company outstrips the facilities of the service bureau it has been using for its financial systems?

Obviously the company might be able to shift to a larger service bureau, but sometimes that's neither practical nor desirable. Three years ago Helix Technology Corp. faced that dilemma, a dilemma compounded by the firm's lack of in-house DP expertise.

Helix sought outside advice and today has its own data center and technical staff, a growing catalog of application systems and a continuing rapport with the software/systems house that helped out when the help was needed.

For its part, Interactive Management Systems, Inc. of nearby Belmont has taken advantage of its affiliation wth Helix to gain a better overall understanding of what user organizations need and to extend its packaged applications in directions Helix suggested.

### Search for Solution

As Suzanne Long, Helix's manager of management information servcies, told the story recently, it began in 1974-75 when Helix took stock of its shortcomings and sought outside help. But the company focused on getting help from a consultant who understood DP hardware and had experience with business systems.

Long had those qualifications and joined the company in February 1976, then spent four months just getting to know the structure and workings of her new employer. Helix works with both cryogenics and power systems and has plants both in Massachusetts and Colorado.

Once she determined that no service bureau could handle the work at an effective cost level, Long considered going with a batch-oriented IBM System/3. But on-line capability was what Helix really needed, she realized, so she continued her search for a solution.

After meeting Interactive Management's President Brian Boyle, that summer, Long reasoned that his Digital Equipment Corp. PDP-11/70 was the type of equipment she wanted, that his software was generally what Helix needed and that the closeness of the two firms might mean the Interactive Management CPU could serve as backup for Helix.

The next six months she spent "specing" what Helix would need in the way of application support, what packages Interactive Management had and what part of that software her company might be able to use or adapt to its needs.

### Joint Effort

By December 1976, Long began pulling together a staff of DP professionals with PDP-11 experience and by May the software/-systems house had supplemented the Helix crew with one of its own people on-site here in Waltham. Ultimately, Interactive Management had anywhere from two to five people on the project.

Programming on seven systems and special software to ease conversion from the General Electric 225-based service bureau environment began concurrently with the staffing effort, but the target date of July 1, 1977 for conversion was put off until August in order to get real user involvement in the effort.

The terminals were installed in the user areas long before the systems were up and running, and users were encouraged to become familiar with them. Practice runs were set up, and Long's teenage son David, with high school exposure to computers, showed the users how comfortable the interface could be.

Helix has now installed five systems including the central portion of Interactive Management's accounts receivable package, enhanced to allow the entry and accounting of all cash received, whatever its source.

*(Continued on Page 22)*

# 'Vollie' Eases Programming

PRINCETON, N.J. — Just introduced by Applied Data Research, Inc. (ADR), Vollie was designed as a comprehensive system for on-line program development in a CICS DOS/VS environment. Vollie is a successor to ADR's The Librarian/Online Library source program management system, a spokesman said.

The system was developed for use with IBM 3270 Model 2 CRT stations. Its facilities include a library system for permanent data storage and support for full on-line data entry and editing, the spokesman said.

In addition to a variety of security features, Vollie supports on-line maintenance for DOS/-VS source statement libraries and the facilities of The Librarian as well as remote job entry and output retrieval under IBM's Power/VS, he added.

Vollie provides each user with a permanent and secure data storage facility, he said. Members of the on-line library are compressed to conserve disk space and to minimize I/O; when members are deleted, their space is immediately reuseable, he explained.

Each user creates his own members in the on-line library. Vollie supports tabbing, allows hexadecimal data to be entered from the terminal and takes advantage of the hardware editing facilities of the 3270 to perform full screen editing, he said.

"Books" from a source statement library can be displayed on the screen, copied to the on-line library and modified. For sites using ADR's The Librarian, modules on the master file can be displayed, copied, modified and replaced on the master file by Vollie.

Vollie maintains The Librarian's data stamps and logs everything in and out of the update operation.

Vollie's interface with Power/-VS is said to provide an internal reader for job submission directly to the Power queues; the ability to display various queues and all jobs active in the system; and the ability to view job output at the screen and to list, punch or delete it.

Enhancements expected during the first half of this year include on-line updating of DOS/VS source statement libraries, DOS/VS data management services, an interactive command executor and on-line syntax checkers for Cobol and JCL, the spokesman noted.

The permanent license fee for Vollie is $9,500. A monthly lease costs $350, but three- and five-year plans can bring that down to $307 and $227, respectively, ADR said from Route 206 Center, Princeton, N.J. 08540.

# IBM 5110 Applications Set for Autumn Debut

ATLANTA — When IBM introduced the 5100 recently [CW, Jan. 16], it also announced several application packages that will be distributed on floppy disk for the system. Several other packages will be available on tape for use with either the 5110 or its predecessor, the 5100, according to a spokesman.

Like the 5100, the 5110 supports APL, Basic or both languages, he noted.

The floppy disk-based applications include a general ledger system that IBM said can be tailored to meet specific user requirements. It can produce income statements, trial balances, general ledger balance sheets and statements of changes in financial position, the spokesman added.

An accounts payable program produces reports showing vendor names and addresses, original transactions and corrected entries, paid items in vendor sequence, trial balances, cash requirements and authorized payments. The program also produces checks and a "payables due" worksheet, IBM said.

Both the general ledger and the accounts payable programs will

*(Continued on Page 22)*

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## 'UFO' Updated

HASBROUCK HEIGHTS, N.J. — Improved performance and "native" access to DL/1 or Total data bases are among the enhancements built into an updated version of the User Files On-Line (UFO) application development package, according to its vendor, Oxford Software Corp.

Running under control of IBM's CICS/VS on IBM 370s, the updated package, known as UFO R2V2, also provides enhanced paging, browsing and scrolling capabilities as well as multiple file/multiple record creation and maintenance, the spokesman said.

UFO now handles display-to-display transfers better than before and the package is the only CICS/-VS general-purpose program to support on-line report generation and sorted reports, he claimed.

The software supports two dictionaries. One lists data field names and the displays in which they are used; the other is comparable to a data base data dictionary in that it defines what the data elements are and where they can be found.

A Query facility allows non-DP personnel to enter SELECT and SORT parameters to modify previously defined displays.

UFO runs under either DOS/VS or OS/VS and is modular in structure. The system can be acquired for $225/mo from Oxford at 174 Boulevard, Hasbrouck Heights, N.J. 07604.

## Disk-Resident 'Sputnic' Drives Series/1 Terminals

NEW YORK — Described as a "CICS-type" multitasking, multiuser operating system for the IBM Series/1 minicomputer, the Synchronously Programmed User Terminal and Network Interface Control (Sputnic) package is now available from Series/1 Small Business and Communications Systems Corp.

Sputnic functions as a disk-resident operating system that is macro-driven to provide programmers with the means of developing real-time systems in a device-independent environment. The I/O subsystem is "modeled after IBM's Vsam" and includes DASD space management, a spokesman said.

The package supports both asynchronous and bisynchronous communications protocols. It includes extended basic mapping facilities for IBM 4979, 4978 and 3270 CRT subsystems and support for "several" Hewlett-Packard and NCR terminals, he added.

Sputnic is an "ideal front-end and nodal component" on mainframe-based networks, the spokesman said, because of its distributed processing capabilities and easy interface with other software.

The software can be purchased for $3,500 or leased for $125/mo, he said from 745 Fifth Ave., New York, N.Y. 10022.

## Combined Effort Has Good Payoff

(Continued from Page 21)

That was a Helix requirement and one that the software designer now includes as a standard part of its package.

Other applications currently include extensive accounts payable operations including cash projections, a transaction-oriented general ledger system, a costing system including reporting by jobs and a labor distribution system, but not payroll, which is still — deliberately — being handled by Helix's bank.

An inventory file of receipts and issues is in place, but the order entry, purchase order and inventory control routines needed to make it into a full inventory system are still some time off, Long said.

The company has implemented the software in its Massachusetts locations with data communications linking outlying sites with the PDP-11/70 here. Links to the plants in Colorado and other Helix locations are being planned.

## Systems Planned For IBM 5110

(Continued from Page 21)

be available in September for identical license fees of $75/mo which are paid up at the end of 12 months.

Also scheduled for first delivery next autumn is a generalized report generation package. With this facility, users can format and then produce a range of reports covering such diverse things as personnel, sales forecasting and analysis and equipment maintenance scheduling, IBM said.

The license fee for this business report package is $50/mo; like the others, the license is paid up after 12 months.

The tape-based applications available for both the 5100 and the 5110 include a construction payroll program written in Basic; a problem-solving library of business analysis, mathematics and statistical program, also in Basic; and print/plot programs, offered in APL or Basic.

The 5100, the 5110 and the software for them are all products of IBM's General Systems Division, based here in Atlanta.

Does its broad line make Centronics' matrix printer family the best? NO. Even though the Centronics 700 series is a continually expanding printer family — currently 9 models and a range of print speeds from 60 to 180 cps — there's much more to it than just breadth of line. For example, there's a choice of 6 different types of forms handling capability; choice of uni- and bi-directional operation; and choice of 80 and 132-column formats. Why so much choice? It comes from the simple, highly flexible modular 700 series design that delivers superior reliability, exceptional parts commonality — and competitive prices.

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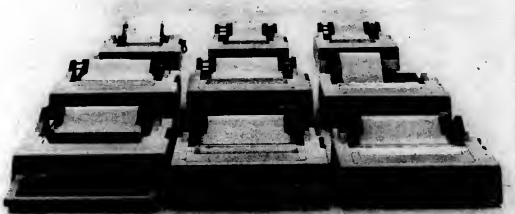

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# DP Dialogue

Notes and observations from IBM
that may prove of interest to
data processing professionals

## BCS 'Test Flies' Online Systems with TPNS

"Putting any part of a critical computer system online without thorough testing—under every likely and unlikely condition—would be like test flying an airliner with passengers aboard."

The analogy comes naturally to Jerry Kotulan. As manager of technology for Boeing Computer Services, Inc. (BCS), Seattle, Kotulan has a complex of six IBM Model 168's in his charge. One of the most critical applications in the center is the On-Line Planning (OLP) System, which supports manufacturing operations in the Boeing Commercial Airplane Company through 330 in-plant terminals.

### A Realistic Test

"IBM's Teleprocessing Network Simulator (TPNS) lets us test a system under realistic operating conditions, including heavy terminal traffic," he says. "The simulator incorporates 'scripts' of typical user transactions and exercises all of the network support software as well as the system logic.

"There's a lot more to testing a large online system than just validating the logic," Kotulan points out. "How well does it work with a full load of terminal transactions? Where does response time fall off? At 300 users? At 350? TPNS gives us accurate measurements of such performance variables directly, without involving the terminal network at all."

### Controls 470,000 Parts

Today the mainstream of the work of several hundred manufacturing engineers is on the OLP system; it controls tool planning and shop order release for 470,000 airplane parts. It is part of a developing family of manufacturing applications that will include an Order Location System to track work through the shop and a Parts Inventory Control System. This entire group of programs, Kotulan explains, will run under the Information Management System/Virtual Storage (IMS/VS).

"To use TPNS, we write a few test transactions, which are enough to exercise every system function. Then TPNS acts as an application program 'driver,' using these inputs to generate message traffic. We can ask it to generate any desired transaction load profile, to bring out hidden logic problems and obtain detailed measurements of performance under load," Kotulan says.

"When we make a maintenance change or enhancement, it must be done fast and be 'transparent'—unnoticeable—to the user. New systems must be correct at startup and stay that way. TPNS helps us meet that reliability standard."

*Computer-based manufacturing systems help Boeing build commercial aircraft like these giant 747's. IBM's TPNS lets Boeing test such online programs under realistically simulated conditions.*

## Simulated Spine Hastens Injury Research

The effect of a 30-mph automobile crash on the human trunk is shown by these drawings derived from a computer. A normal spine is at left; the center and right views show its position 20 and 40 milliseconds after impact.

This insight into the complex mechanics of the backbone was made possible by a mathematical model of the spine, developed on an IBM System/370 Model 158 at the Chicago Circle campus of the University of Illinois, sponsored in part by the Aerospace Medical Research Laboratory. Engineers at the university are studying the effects of injuries and disease on the back.

The potential benefit is far-reaching, since eight million people in the U.S. suffer from back problems, and half a million currently wear braces.

"We don't know much about that sophisticated structure we call the spine," says Dr. Albert B. Schultz, professor of mechanical engineering. "We're working with orthopedic surgeons to learn more, in the hope of preventing and treating back problems."

"Because we can apply engineering principles to the skeletal system," adds Dr. Ted B. Belytschko, professor of structural engineering, "we can sometimes determine in a few days responses to treatment which would take years to find by observing results of therapy."

In one experiment, the computer simulates the force applied to the spine by a therapeutic brace. "This helps show us the effectiveness of different modes of treatment," Dr. Schultz notes. "In treating lateral curvature of the spine, or scoliosis, the model has told us that applying pressure from the side will often be more effective than a stretching force."

By means of the computer model, engineers in the university group have predicted the effect of a hip-to-neck brace in a number of patients. The actual results of treatment supported the predictions in 80 percent of the cases.

Each year an additional 400,000 American workers incur back injuries; Dr. Schultz and his colleagues expect the computer model to help analyze their causes. The results will be available as guidance to therapists, orthopedists and industrial safety programs.

## Auditing Aids for DP Systems

Three software products available from IBM assist the auditor of DP systems:

1. **Audit-Source Code Compare for System/370 DOS/VS and OS/VS** compares two versions of the source code of a program and lists the differences. Verifies that only authorized changes have been made.

2. **Change Management Tracking (CM/T)** keeps a record of changes to production application libraries. Generates reports of change history and aids reconstruction of a library from a backup copy.

3. **IMS/VS Data Base Structure Mapping (IMSMAP/VS)** produces maps and reports on a line printer describing an IMS/VS data base.

For more information on these and other IBM software products, contact your local IBM branch office or write to the Editor of DP Dialogue at the address below.

*DP Dialogue is designed to provide you with useful information about data processing applications, concepts and techniques. For more information about IBM products or services, contact your local IBM branch office, or write Editor, DP Dialogue, IBM Data Processing Division, White Plains, N.Y. 10604.*

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# More Than 1,000 Titles In Updated Bibliography

**J. Daniel Couger On Education**

More than 275 new books are listed in the 11th edition of the *Annual Bibliography of Computer-Oriented Books*, published this month by the University of Colorado.

Notable in this year's listing is the increase in quantity and quality of books on the subject of program design and data base design. In addition, there is a 75% increase in the number of books on management of data processing.

All books prior to 1973 were deleted, except for classics like Dahl and Dijkstra's *Structured Programming*. Despite the deletions, the bibliography still contains more than 1,000 books from 207 publishers.

The category on program design, only in its second year, now contains 22 books. Six new books were added including the two volumes in Raymond Yeh's series on *Current Trends in Programming Methodology*. Brown's *Software Portability* is an example of the pragmatic books in this category, compared with theoretical books like Hecht's *Flow Analysis of Computer Programs*.

Although there are now more than 35 books on the subject of structured programming, few publications are available on structured design. The new book by Gane and Sarson, *Structured System Analysis*, is representative of the improvement of books in this area.

*Documentation of Software Products* by Lomax is a book on a neglected subject, as is *System and Programming Standards* by Wooldridge.

The section on data base was increased 40% with the addition of 16 books. Gio Wiederhold's *Data Base Design* is an example of the high-quality books now available on this subject. The 607-page tome by Wesley Chu, *Advances in Computer Communications*, is the most comprehensive of the 13 new books in that category.

### Painfully Slow Upgrade

A painfully slow improvement is occurring in the books devoted to management of DP. Of the 13 new ones, only five are noteworthy. One of the better books is the updated version of Joslin's *Computer Selection*.

The computer reference section was increased by 10 books that should be a part of the computer library of every organization.

An important change is occurring in the books on management information systems, reflected by House's *Interactive Decision-Oriented Database Systems*. Although few of the 11 new books have an emphasis on interactive systems, the trend is clear.

The bibliography contains 12 categories on computer applications. A total of 35 new books were published in this area, among them *Marketing Management Information Systems* by William King. Beltram's *Models for Public Systems Analysis* is an example of new books in that application sector.

The Institue of Internal Auditors' three volumes on *System Auditability and Control* contain guidelines important to designers of business systems.

Eight books in microprocessor design and 10 on simulation were published in 1977.

*Magic Squares* by Paul Caulter is representative of some of the new math books for high school and college students.

The special category had 15 additions on subjects like security/privacy and the future of computing.

Copies of the bibliography are available for $4 from *Computing Newsletter*, Box 7345, Colorado Springs, Colo. 80933. The cost is $5 if an invoice is required.

*Couger is professor of computer and management science at the University of Colorado.*

# Harris Supports 'Total' Queries

FT. LAUDERDALE, Fla. — Designed to enhance the usefulness of Cincom Systems, Inc.'s Total data base management system on Harris Series 100 and 200 CPUs, Total-IQ allows users with limited DP knowledge to get timely information from the system, according to a Harris spokesman.

By supporting accesses to the data base from a terminal, the software eliminates conventional programming requirements.

In common with many modern query systems, this one allows users to store procedures for reuse, he added.

Total-IQ costs $10,000 and is available immediately from Harris Corp. Computer Systems Division, 1200 Gateway Drive, Ft. Lauderdale, Fla. 33309.

# 'Total' Moved To RSTS/E

CINCINNATI — With the introduction of Total for Digital Equipment Corp.'s RSTS/E environment, installations with any of DEC's PDP-11 line, from the model 11/34 through the 11/70, now can use the data base management system from Cincom Systems, Inc.

The RSTS/E Total is available in a multitasking version which is directly compatible with the implementations of Total that have been previously adapted to DEC's RSX-11 and IAS operating systems, a Cincom spokesman said.

Total includes a data manipulation language with both command and control functions that can be accessed with Macro-11, Cobol V3, Fortran and Coral under RSX-11 and IAS, as well as any Basic Plus II and Cobol V3 under RSTS/E, he added.

RSTS/E Total provides record-level lockout, a data base recovery module, buffer pool sharing and fully reentrant code, the vendor claimed.

Released as of the first of the year, the newest version of Total costs $18,500, but discounts are available for multiple location installations or OEM users.

Cincom Systems is at 2300 Montana Ave., Cincinnati, Ohio 45211.

### For Microcomputers

# Business Tasks Packaged

ORANGE, Calif. — A software package for microcomputers that includes general ledger, accounts receivable, accounts payable, finished goods inventory control and payroll has been introduced by The Computer Mart.

The Grimes Business Information System (GBIS) was developed by Larry G. Grimes & Associates and Computer Products of America. In a typical application, GBIS can store on a single minifloppy diskette up to 400 customer listings, 50 vendors, 400 line items of inventory, 25 employee records and 60 general ledger accounts, a spokesman claimed.

Requiring 24K of memory, GBIS is an interactive system in which receivables decrease book inventory, payables increase book inventory and general ledger accounts are updated automatically with accounting controls, he said.

### North Star Basic

GBIS is written in North Star Basic, but other disk-based Basics can be used for the listings, he noted.

Within the individual application areas, the general ledger logic produces general journals, balance sheets, comparative balance sheets, income statements, a trial balance worksheet, expense budgeting reports and a chart of accounts.

The accounts receivables routines runs produce reports of aged balances, customer listings and mailing labels while the accounts payable routines generate account status reports, vendor listings and, again, mailing labels.

The inventory control programs are said to produce status reports and product listings as well as to support on-line order entry, invoicing and purchase orders.

GBIS costs $200 and is available through some personal computer stores or, for an additional $2.50 for postage and handling, directly from the Computer Mart, 633 W. Katella Ave., Orange; Calif. 92667.

# 'Scanner' Aids JCL Updating

PAWNEE, Ill. — The JCL Scanner from Illini Software Co. enables users to make mass changes in OS/VS job control statements by replacing every instance of a user-specified character string found in current JCL with another string, according to a spokesman.

The user has control over both the search and the replacement values, the search column range and the JCL media, he said. The search and replacement values may be different lengths, in which case data shifting will occur to maintain JCL validity, he noted.

Input to the JCL Scanner is the user's JCL on any media and the operating parameters. The output is the converted JCL in sequential form and an audit listing showing exactly where any replacements were made.

Any replacements attempted but not allowed because of logical JCL constraints are also indicated, the spokesman said.

The scanner will run in any IBM 370 OS/VS .environment. The package costs $250 and includes documentation and a test case,

Illini Software can be reached through P.O. Box 684, Pawnee, Ill. 62558.

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# APL Standard Discussed

NEW YORK — A proposed standard for the interchange of APL workspaces makes no attempt to define the language itself, according to Prof. Garth H. Foster of Syracuse University.

Instead, he told a recent meeting here, the draft standard "is intended to facilitate the exchange of APL functions and variables between APL installations in a manner that is independent of specific APL implementations."

The proposed standard, now under consideration by the worldwide APL community, was developed by an ad hoc committee formed under a meeting of APL implementors last September at the Syracuse University Minnowbrook Conference Center, Foster told the meeting sponsored by Think, Inc.

Foster has been active in APL projects since 1967 and was the organizing chairman of the Association for Computing Machinery (ACM) Special Interest Committee of APL. He was also instrumental in the planning of the Minnowbrook conference and the development of the proposed interchange standard.

The APL meetings, open to anyone interested, will continue on Thursday, Feb. 9 with consideration of the use of APL for systems work presented by E.T. Irons, acting chairman of the computer science department at Yale University.

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# Mini-Based Logic Lets Users Solve Problems

**By J. Van Duyn**
Special to CW

BRISBANE, Calif. — By switching from manual office operations to an in-house minicomputer, a supplier of important plant-related items has been able to reduce its inventory control from 75 hours per week to less than four hours per week. In addition, by switching from a service bureau to the same in-house mini, an accounting firm saved considerable turnaround time in its financial applications.

These dramatic reductions were effected by a new concept in small business computers: an integrated hardware/software minicomputer that allows nontechnical small business users to develop and execute business applications in English.

Landmark Designs International does over $2 million business a year importing wholesale ceramics, macrames, etc., from Japan, the Philippines, Hong Kong and Taiwan. The company makes up assortments to orders and ships them in packages to 60 salesmen throughout the U.S. and Canada. Because the warehouse personnel have to select the merchandise piece by piece to make up the individual orders, inventory control is rather complex.

"We were spending between 65 and 75 hours weekly to recap our shipment and post our inventory control for that week," Lynn Mahoney, the office manager said, "And because we're growing so fast, it became impossible to handle the volume manually. Now we enter 2,000 line items a day into the computer, and it takes one of my staff about a half an hour a day. In addition, the computer generates a summary report daily, making our inventory control really up-to-date."

### Plain English

When Landmark Designs management decided to automate its manual processing, they investigated a number of systems. Among the many small business computers they considered, Logical Machine Corp.'s Adam made the greatest impact on them. In the words of Mahoney: "When at their demonstrations we saw that we could program in plain English and not some 'English-like' computer language, and that we didn't have to be afraid to touch this computer because there's nothing on the keyboard that can 'blow up the system' or 'destroy the programs,' as is the case with all the other computers we've seen; we opted for Adam."

Mahoney expressed her obvious satisfaction with their choice when she said, "The current inventory control system we have took me less than five hours to get on the computer. It was very easy. However, I'm quite aware that when I develop a more sophisticated inventory control system on Adam sometime in the future, I will have to do a lot of painstaking programming.

"At the present time, if we don't have a particular item in stock, we make the substitution. Eventually, Adam will do these substitutions for us. Specifically, the system will go through the inventory, check the items, and if a certain item is not in stock, the system will substitute it with another item in the same price range."

Mahoney, however, is delaying putting the accounts receivables and payables, the billing and the sales commission applications on the computer until she corrects the order entry application. It seems "Adam is bringing up the wrong information. We usually have a shipped-to address and a billed-to address. Well, when I give an account number to Adam, it's responding with the name and address of that account. Only somewhere it's switching around the shipped-to address with the billed-to address, so I'll have to get back into the program and find out why it's doing it."

### Basic Configuration

What is this minicomputer that provides nontechnical business end users the ability to program in their native tongue? To begin with, Adam's basic configuration consists of a CPU with 32K bytes of and a CRT terminal with standard typewriter keyboard and a few special function keys.

Most importantly, however, Adam operates as a list-oriented interpreter, accepting and executing both basic and user-added verbs and nouns in simple, straightforward English (or any natural language) from a disk data base dictionary.

### Accounting Woes

Contrary to Landmark Designs International, the CPA firm of Schwartz, McGuire & Co., of San Mateo, Calif., has been using a computer service bureau for years to process its general ledger and financial statement applications. Corporate, business and individual income tax returns, however, were done manually.

"The primary reason we considered buying or leasing an in-house small business computer, was to eliminate the delay in turnaround time the service bureau tends to impose on you," Charles McGuire, one of the partners, said. "We had to send our work to the service bureau through the mail. That took two days, minimum. Then it was two or three days until they processed the work. So typically we've had a week's turnaround time. And when we had to correct an error in the printout statements, we were faced once again with the same delay in the turnaround time. That's why we looked into the possibility of an in-house computer. We investigated some four or five minicomputers, including Basic Four, Singer and Burroughs, before we decided on Adam.

"We chose Adam because of the ability of this minicomputer to provide or generate, if you will, applications that suited our particular needs. We wanted to process not only a general ledger system for our large clientele, but also an income tax return system. We wanted a minicomputer that could provide both of these highly specialized systems, so that we could eliminate the service bureau cost and substitute the cost of the minicomputer. In short, make the in-house computer affordable. None of the other small business computers — with software application packages — met our requirements."

### A Taxing Chore

Since McGuire, a nonprogrammer, wanted to develop his own applications, the fact he could do it in English was a plus factor. Nevertheless, it took him many months — with considerable assistance from the staff of Logical Machine — to design, develop and implement the income tax return application.

"Instead of first getting our feet wet with some simple program, we plunged into the complex income tax return application," McGuire said with a grin. "What makes this application so complex," he explained, "is the multitude of variables, such as identification, segregation and classification of capital gains, for example. But it's up and running. We have, in fact, both the income tax return and the equally complicated general ledger applications on Adam. And we're quite pleased with their total performance."

*Van Duyn is the author of several books, including the* Practical Systems & Procedures Manual *and the forthcoming* DP Written and Verbal Communications, *both from Prentice-Hall.*

### TRAINING VENDORS

Individuals and organizations interested in providing technical training courses for New York State computer systems analysts, computer programmers, and EDP management personnel for the period July 1, 1978 through June 30, 1979, should contact William F. Woodard, Information Systems Training Supervisor, NYS Department of Civil Service, State Campus, Bldg. 1, Albany, NY 12239; phone (518) 457-2297, 457-5614, by March 28, 1978.

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## Amdahl Came In Quickly

# Package Key to Hurried But Unharried Switch

**By Rocco Plaia**
Special to CW

In the spring of 1976, Liberty National Life Insurance Co. ordered an Amdahl 470. While making a decision on a computer, we realized that some of our software systems were surviving solely due to the emulator on our IBM 370/155 and would soon become obsolete. New systems had to be developed or purchased prior to what we thought to be a late fall hardware conversion.

One such system was supplies and inventory control, which we had originally planned to develop ourselves. Since our company is quite unique in its DP requirements, we didn't expect to find a packaged system that would work without extensive modification.

Liberty National has about 4,000 employees spread over 13 states, working out of 150 district offices. Our current insurance in force is in excess of $8.9 billion with assets approaching $1.3 billion.

Most of our supplies and inventory are forms and policies. But we also maintain a large stock of sales aids which we sell to our agents to use as promotional items. These items could be anything from sewing kits to golf balls.

We process about 3,000 transactions a week on a weekly cycle. We work with six asset accounts and 15 or 20 expense accounts. Our fire company and investment group have different expense accounts. It is in this area that most of our modifications had to be made.

Delivery of the Amdahl was within 10 days of ordering, considerably sooner than expected. So our staff was already involved with other projects. We had to consider purchasing a software package for supplies and inventory control.

We had talked to MSA about its supplies inventory control and purchasing system earlier in 1976. So it was the first company we thought of and the first we contacted.

### Areas of Concern

In our search for a software package, there were three areas of primary concern. First, we wanted an established product. This may not always be the situation, but our hardware conversion made it a necessity.

Second, we wanted the response of current users of the package. Their experience and remarks were very beneficial in helping us make a final decision.

Finally, we considered the kind of "defined" support that we could expect from the software vendor after installation of the product. Once we were satisfied that these areas were successfully complied with, we studied the technological aspects of the system in more detail.

We took several weeks to make a decision. During this time we visited one of MSA's client companies that had inventory requirements similar to ours and an installation only slightly larger. We saw first hand how their system operated and their favorable response to it.

Also during this time, our users contacted several other users for their comments and arrived at the same conclusion: the system was sufficient and easily adaptable to almost any environment.

Usually it takes two or three months to convert to a system like this. A parallel run is made, tests are run and all the bugs are worked out before going live with the system. But not having a system to run parallel with, we went live first and made corrections later.

It worked. We got it going in a month and very few corrections had to be made.

The support we got from MSA was very critical to us at this time. Our approach to the implementation of this system put MSA on the spot and the firm came through it very well.

We had done as much preparatory work as possible prior to MSA's coming to make the installation. We wrote two or three programs to convert our old inventory master file and create all the other files necessary for a successful conversion. When MSA came in, these programs were then modified in less than one day.

By the time the MSA people got here we were ready to go.

They spent two days installing our system and training our people to use it.

Even though we spent considerable time studying the documentation ahead of time, we couldn't have gone live without this period in which to answer questions.

A few modifications had to be made to tailor the system to meet our needs. Although MSA wasn't actually involved with making the modifications, it did make suggestions and offer advice. During the two-day training period the company helped us decide the best approach to take.

MSA offers five days of training and assistance with its packages. We only used two days, because we wanted to save the other three for any future assistance we might need.

We've been satisfied with our supplies inventory control and purchasing system. It has performed the way we expected it to and the way it was presented to us.

*Plaia is a senior systems analyst at Liberty National Life Insurance Co., Birmingham, Ala.*

# 'Remap' Aids B4700 Users

HILLSDALE, N.J. — The Record Extraction, Manipulation and Print (Remap) program from Pascack Data Services, Inc. was designed to enable installations with Burroughs Corp. B4700 CPUs to generate reports without the aid of programmers.

Remap is a two-pass system capable of selecting records from an existing disk file, sorting them into a specified order and generating reports designed by the user, a spokesman explained. Additional capabilities include all arithmetic functions and the accumulation of two levels of totals.

Once developed, a procedure can be stored for later reuse, he added.

While it supports the creation of both one-time and regular reports, the package also allows the user to experiment during the design phase of system development, producing varied report formats quickly until the optimum one has been selected, the spokesman said.

The parameter-driven system sells for $1,100, and Pascack can be contacted through P.O. Box 215, 77 Brookside Place, Hillsdale, N.J. 07642.

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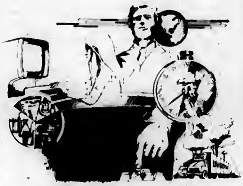

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# Execunet Ruling Opens Long Distance Options

**By Ronald A. Frank**
CW Staff

WASHINGTON, D.C. — Data communications users and others will reportedly gain more flexibility in the choice of long distance service as a result of a recent U.S. Supreme Court order relating to Execunet service.

Execunet is provided by MCI Communications Corp.as an alternative to all-Bell long distance facilities. About 1,000 users of the service are data communications customers, according to an MCI spokesman, and typically operate at 4,800- and 9,600 bit/sec.

The Execunet service had not been provided to new customers pending a Supreme Court decision on whether to review the findings of a lower appeals court. The appellate court ruled AT&T did not have a monopoly on long distance telephone service.

The Supreme Court refused to reconsider the earlier decision, effectively opening long distance services to competition.

Under the MCI service, a user utilizes telephone company local facilities to get connected to MCI's long distance facilities. At the called city, local phone company facilities are again used to carry the business information from the MCI long-haul facilities to the customer's location.

According to the MCI spokesman, the Execunet service often uses less switching than telephone facilities and is thus more reliable than compatible phone company service.

Although it was believed the court action paved the way for new customers to be connected to Execunet, AT&T filed a petition with the Federal Communications Commission (FCC) stating that it has no obligation to provide additional interconnections with specialized carriers such as MCI. AT&T cited another court ruling that questioned whether specialized carrier interconnections are in the public interest.

The FCC then issued a public notice asking for comments on the AT&T petition by Jan. 30.

Despite the latest AT&T action, an MCI spokesman said new Execunet customers are being serviced using available local facilities. New local facilities apparently will not be provided to the specialized carriers until the latest AT&T petition is resolved by the FCC.

In addition to Execunet, Southern Pacific Communications Co. has a similar offering called Sprint.

### DDS Rebuffed Again

In another action affecting data users, the FCC rejected for a second time the proposed AT&T tariff for its Dataphone Digital Service (DDS).

The DDS rates were rejected as being too low and thus being anticompetitive. The service is the subject of an antitrust suit by Wyly Corp., which is claiming DDS forced its Data Transmission Co. (Datran) subsidiary out of business.

At present, DDS users are being charged under interim rates until the FCC approves permanent rates.

## User Gains Control, Switching

# Memorex Unit Cures Hospital's Net Ills

BALTIMORE — To obtain console network control and switching of communications lines between computers, Johns Hopkins Hospital here has installed a Memorex Corp. programmable 1380 communications processor.

The Memorex 1380 handles data communications between two IBM 370/148 mainframes and a variety of terminals and peripherals. These include a custom-built Siemens minicomputer and a Digital Equipment Corp. PDP-11 minicomputer.

Network applications at Johns Hopkins include an electronic reporting system for radiological examinations, studies and medical plans. It also handles remote job and key-to-disk data entry.

The 1380 enables console-controlled switching of communications lines from the terminals or computer used by these applications to either host mainframe. In addition, the 1380 performs system tests and diagnostics over the network, on-line or off-line, without host participation.

According to Howard Buckholtz of the hospital's DP center, "We selected the Memorex 1380 for greater convenience in switching communications lines and for the added benefits of running diagnostics and system tests off-line. The 1380 effectively handles these tasks, while the IBM 3705 we used previously could not."

The Johns Hopkins network processes a mixture of experimental, medical and routine data. The most exotic use is a radiological exam reporting system developed with the IBM Customer Information and Control System (CICS).

In this system, a radiologist projects a diagnosis from a film strip onto a rear projection screen containing an embedded wire grid. With an electronic probe, the radiologist then selects the appropriate symptom on the projection.

The wire grid picks up signals from the probe and transmits them to an optical image-handling system composed of two IBM terminals.

Supplementary remarks are added manually via the terminal keyboard. The entire report is then transmitted through the Memorex 1380 to the mainframes and can

*(Continued on Page 36)*

# T/S Service Credits Network With Doubling Customer Base

SANTA CLARA, Calif. — MJK Associates, a time-sharing service here for the commodities futures community, reported its customer base has doubled because of its conversion to a data communications network.

"With the interface installation," MJK President Michael A. Marriott said, "we went from a local customer base to one reaching the major capitals of the world... It's let me go after customers I couldn't have considered approaching before."

MJK offers access to an extensive data base of daily and historical figures on 36 commodities reaching back to the 1960s. The company also provides standard and custom software for data retrieval and analysis, although customers are free to write their own programs.

Subscribers use these services to test hypothetical trading strategies and make daily trading decisions.

Before converting to Tymnet, MJK's immediate needs related to its own stress on quality. "Our forte compared with all other services is accuracy," Marriott stated.

The company's data is based on figures released daily by the commodities exchanges, but each figure is verified from alternative sources, sometimes with a call to the releasing exchange itself. At times figures are

*(Continued on Page 32)*

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# T/S Service Cites Net for Doubling Client Base

*(Continued from Page 31)*

verified as many as three weeks later.

The data is also verified mathematically and manually. Discrepancies are regularly discovered and corrected with all of these approaches.

To maintain this level of quality while providing geographically dispersed terminal access, MJK needed a communications network with reliable transmission and value-added features such as alternate routing in the event of line or equipment failure and power fail-safe automatic restart at nodes. At the time, the company also needed a network with buffering capability to absorb input and output backpressure for its leased host CPU.

Other criteria weighed in MJK's network decision related to future needs, particularly for expanded domestic and international coverage and for higher speed transmission.

MJK applied its research and validation skills to its network problem and found Tymnet met these criteria, Marriott said. He described the primary factors in the decision as Tymnet's reputation and record of service and reliability.

Tymnet, Inc. implemented Tymnet service with a CP/8A communications processor and standard asynchronous interface to MJK's communications controller for a Hewlett-Packard Co. HP 3000-II. This Tymcom handles eight simultaneous users at 30 char./sec, but MJK plans to move to a larger capacity model serving more ports at 120 char./sec.

MJK's users are primarily commodities traders, brokers, individual speculators and pool managers and advisors.

Participation in the commodities futures market has always demanded extensive technical analysis to predict prices and trends, but MJK services typically reduce its customers' analysis time from hours to minutes a day, Marriott said.

Most subscribers use MJK to develop and use proprietary programs they feel best predict the market. In general, users rely on MJK for software development, but about 20% write their own programs.

MJK's most popular service provides daily market information and trading signals shortly after the exchanges close. The second most popular service goes by the acronym "Poise" for Portfolio Opportunities Investigated Through Simulated Execution.

This series of programs develops and tests trading strategies against historic data and then generates appropriate daily trading signals.

## Terminal Handles Touch-Tone, CRT Or Voice Output

SAN DIEGO — Wavetek Data Communications has a microprocessor-based terminal called the Model T520 that reportedly can transmit Touch-Tone input and receive either audio response or CRT display output.

The terminal operates over dial-up phone lines and receives audio response output via an optional handset. The CRT output is compatible with audio systems handling FSK/Ascii data at 300 bit/sec, Wavetek said.

The buffered unit can display 256 characters, facilitating verification and correction of data on the screen before transmission, the company said.

The T520 transmits 16 Touch-Tone characters; it is modular so a magnetic card reader, personal identificaiton number (PIN) pad and printer can be added, depending on application.

Prices for the basic terminal start at $1,850, Wavetek said from 9045 Balboa Ave., San Diego, Calif. 92123.

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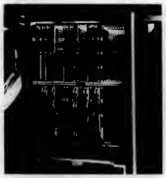

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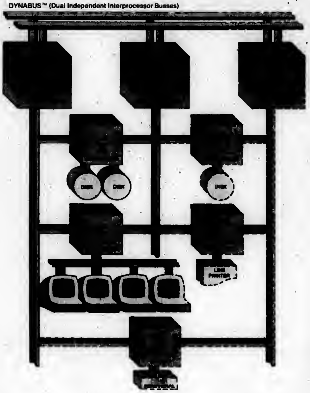

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## Tester Gains Capabilities

ALEXANDRIA, Va. — The Data Tech 9600, manufactured by Atlantic Research Corp., is now available with two plug-in modules for measuring and generating on/-off time in RS-232/V.24 interface signals.

The time measurement module, ATM-1-1, is said to allow the Data Tech 9600 to measure on or off time of any RS-232/V.24 control lead. For example, it measures duration of carrier dropout on a full-duplex circuit. It also provides measurement of the time delays between any two interface signals.

The time-generating module, ATG-1-1, reportedly provides flexibility in inserting delays where needed for a specific application. For example, the Data Tech 9600 can perform such tasks as full-duplex or half-duplex automatic polling with a capability of sending a return message.

The addition of these plug-in modules can expand previously delivered asynchronous Data Tech 9600s for some applications in synchronous networks.

Price of the Data Tech 9600 is $2,300. The modules are $200 each from Atlantic Research Corp., 5390 Cherokee Ave., Alexandria, Va. 22314.

## Unit Does Remote Test Of IBM 3600 Systems

BURLINGTON, Mass. — Intertel, Inc. has extended the capability of its NCS4000 network control system to include IBM 3600 systems that contain remote loops of daisy-chained terminals.

Previously, central-site-initiated remote testing of IBM 3600 system networks could only be made to the upstream side of remotely located IBM 3601 controllers and not beyond to a given remote loop. Now, with the Intertel EI200 adapter, discontinuous terminal subloops can be identified at the central site and bypassed, the company said.

### Dial Backup

The EI200 is a direct replacement for the similar IBM RPQ adapter. When combined with an Intertel DA300 module, it provides automatic dial backup, a feature hitherto not available for the 3600, Intertel noted.

The EI200 performs the conversion between IBM and EIA digital data signals and is fully compatible with standard Intertel products and modems at 1,200 and 2,400 bit/sec. However, the EI200's performance is capable of being extended to 4,800 bit/sec. IBM loop integrated modems, external 3603 modems or RPQ adapters are not required with the Intertel network control system, the company said.

The EI200 is priced at $400 and delivery is 60 days from Intertel, 6 Vine Brook Park, Burlington, Mass. 01803.

## Kit Helps Keep Screens Clean

HILLSDALE, N.J. — A kit developed by the Texwipe Co. reportedly helps ensure a clear view of data displayed on a CRT or computer output microfilm (COM) terminal screen.

The kit includes 72 presaturated terminal wipes for cleaning a terminal. The wipes reportedly are treated with a special fast-drying, nonstreaking formulation which will not harm the terminal surface. The kit also contains 150 lint-free Texwipe cleaning cloths for drying screens after applications of the terminal wipes. Also included is a static neutralizing cloth to prevent the build-up of dust-collecting static charges on the visual display screen, the firm said.

The kit costs $16 from the Texwipe Co., Hillsdale, N.J. 07642.

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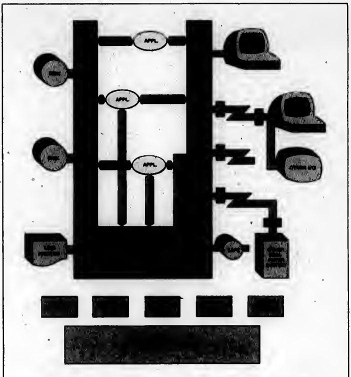

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beginning of the program to set the NonStop mode. From then on, CHECKPOINT controls passing information to the backup process at critical points. CHECKPOINTS occur automatically at any OPEN or CLOSE after the backup is established. These two simple instructions eliminate the downtime, restart, and revalidation which plague any user without the Tandem NonStop capability.

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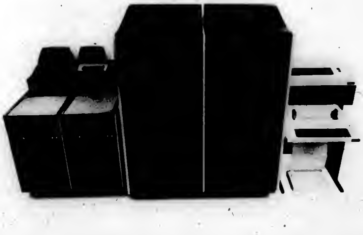

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# Micro-Based Terminal Controller Handles 8B1 Private-Line Systems

MAHWAH, N.J. — A microprocessor-based terminal controller capable of handling terminal speeds of 10-, 30- or 120-char./sec on private-line systems with an 8B1 protocol and offering an array of terminal diagnostics was introduced by Western Union Data Services.

A modified version of the Smarts controller, the unit employs a communications processor with 4K of memory to control terminal polling and selection by a computer in both full-duplex and half-duplex operations. The 8B1 controller is offered with a variety of station arrangements composed of the company's EDT 33, 300 and 1200 terminals.

The controller can be programmed to handle modified 8B1 protocols as well as other protocols to meet specific user requirements, the firm said.

Included as a part of every microprocessor-controlled station is a control panel mounted to the right of the terminal pedestal which provides controls for normal status and alarm indicator lamps needed by the terminal operator to determine operating conditions.

Each terminal station arrangement will provide a hardware address for both selection and polling, will respond to a roll call after receiving a message to indicate correct receipt and is configured to operate alone on a circuit or on a multiple-drop circuit, according to Western Union.

### Full-Duplex Operation

For full-duplex operation, the user's CPU can interrupt terminal communications at any time to poll or select terminals. After each computer transmission, the controller issues verification of message receipt, which includes parity error checking and an answer-back check.

The controller reportedly self-tests its hardware automatically whenever power is turned on or the system reset switch is activated. These tests ensure that the controller can execute all instructions, that data is being stored in all bytes of working storage and that the input/output channels can be written into or read out of.

In addition, a Test/Normal switch opens up the send and receive lines to the data set and busts back to the station transmitted data. In this way, the station is isolated from the line and conditioned to run local diagnostics. The switch also activates a comparison check between transmitted and received data with a printout indicating the results of the test, the firm said.

A typical configuration based on a Model 33 ASR teletypewriter with 8B1 controller will cost about $167/mo on a three-year lease, a spokesman said. Western Union Data Services is at 70 McKee Drive, Mahwah, N.J. 07430.

# *Modem 201C-Compatible*

FORT WASHINGTON, Pa. — A 2,400 bit/sec modem available from Tele-Dynamics is Bell-201C compatible and incorporates features similar to those of the Bell 201C, but is said to be more cost-effective.

The Tele-Dynamics Model 7201C is available in two configurations, one for private lines and the other for the dial network. The dial-up version is designed for direct connection to the switched network, the firm said.

The 7201C has both self-test and loopback-test capabilities.

The private-line version, the 7201-PL, costs $765 while the FCC-registered dial-up model costs $805. The Tele-Dynamics Division of Ambac Industries, Inc. is at 525 Virginia Ave., Fort Washington, Pa. 19034.

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# *PEP-500 Converter Linked To Tektronix Terminals*

N. BRUNSWICK, N.J. — Princeton Electronic Products, Inc. has introduced a computer graphics terminal interface option for its PEP-500 image memory/scan converter. This interface is said to allow direct plug connection of the PEP-500 to Tektronix, Inc. models 4010, 4012, 4013, 4014, 4015 and similar terminals.

The PEP-500 converts graphics terminal X-Y signals into standard EIA composite video output, allowing group viewing of computer-generated engineering, statistical or scientific graphics on TV monitors and projection TV systems, or recording of graphic material on standard video tape or disk systems, the firm said.

When connected to TV monitors, the PEP-500 allows use of existing graphics terminals for black and white images, remote graphics display on video monitors and continuous display of an image for an hour or more without image refresh or rewrite.

The system can be used for display of computer-generated graphics data for business and engineering applications on CRT screens.

The device costs $4,350 from Princeton Electronic Products, Inc., Box 101, N. Brunswick, N.J., and delivery is 50 days.

# Memorex 1380 Increases Hospital Net's Flexibility

*(Continued from Page 31)*

be displayed at any terminal in the network. The result is accelerated reporting of X-ray results, the hospital said.

This X-ray reporting system is currently being upgraded to run on custom-built Siemens Sirep minicomputers, which will provide a multipoint binary synchronous network using Ascii protocol.

The PDP-11 in the network is used for medical laboratory analysis. Again the data is transmitted thorugh the 1380, which handles mini-to-mainframe and mainframe-to-mini interfacing and code conversions in software without having to use programs in the mainframe itself.

The remote job entry system handles all program development by the DP staff as well as two other applications. The first is statistical work for the Department of Epidemiology. Under federal grants, the department studies the occurrence and distribution of a wide variety of diseases.

The second application involves handling patient medical records, billing and administrative tasks for the Columbia and East Baltimore Health Plans.

### System Benefits

In all the applications, the 1380 processor permits intervention to switch communications lines from one main computer to the other. The earlier system in use at Johns Hopkins did not permit such switching; once a computer opened a line, it owned it.

With the 1380, line switching requires only a few keystrokes at the communications processor console, according to the user.

The 1380 console display shows what is being done and, if required, can show the contents of the communications processor memory. The system commands are said to be simpler than the complex commands required from the control panel of the previous unit.

The Johns Hopkins Hospital installation includes the low- and medium-speed line options for the processor to handle asynchronous and synchronous communications of 134.5- to 9,600 bit/sec. Additional wideband line set options can boost the speed up to 230 kbit/sec, with a total aggregate data rate of 100,000 char./sec in synchronous mode.

The 1380 can be configured to handle up to eight host computers with four computers active simultaneously. The processor stores communications control programs on its own flexible disk, eliminating the need to be loaded from the host. Processor memory can be dumped to the flexible disk and subsequently printed in hard copy.

Memory contents can be altered from the system console. The processor also makes possible the switching of all lines from one host to the other, to keep the network in operation while one computer is down or undergoing maintenance.

Before the Memorex unit was installed, failure of one mainframe brought all programs to a halt, the hospital said.

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## *Points to 30% Productivity Gain*

# User Operating Two Days After Installation

BOUNTIFUL, Utah — "We're in the hardware and software business too, so we know what it's like to be behind the 8 ball. When a key-to-disk system arrived a week late, no one here was particularly surprised.

"But when we started using it to communicate at 9,600 bit/sec to our service bureau less than two days later, our management was impressed," according to Fred Zickert.

Six months later, management is still impressed. The terminal system at Kenway, Inc., a leading manufacturer of automated storage and retrieval warehousing systems, is credited with increasing operator productivity by 30% and, at the same time, allowing the company to be more responsive to its own in-house users.

For Zickert, DP manager of Kenway, the 5M-byte disk system represents not only a solution to his present processing needs, but to future ones as well.

"That was one part of the problem with our older, engineering-oriented systems," Zickert said, recalling the company's experience with its conventional keypunch equipment. "They just couldn't keep pace with the growth of the company."

## Terminal Transactions

To add some muscle to its DP operations some years ago, Kenway switched to a service bureau in 1972, still using the in-house equipment for trial balancing. Unfortunately, the service bureau was 20 miles away in Salt Lake City.

"With 10,000 to 20,000 cards at a time, there were always errors. Even with a very low error rate," Zickert said, "several cards in a batch were always wrong." And it takes only one, he was frequently reminded, to create an abend in a production run.

To correct the data, "we'd either have to call or drive back to the plant to get the right information." Some days, there were more than several round trips from Bountiful to Salt Lake City.

"It wasn't a matter of not recognizing remote batch at that time," Zickert said. "It was simply a matter of convincing the service bureau that it had to change from an over-the-counter operation to a remote job entry one. That meant installing IBM 3705s.

"After that, it wasn't difficult to convince our management that with the proposed cost trade-offs, we'd not only get better service, but reduce the overall service bureau charges."

### End to Keypunches

That accomplished, the company had to decide whether to simply find a remote batch terminal and continue to utilize its keypunch facility or find a multifunction data entry and batch terminal device.

The continually rising rental prices on the keypunches coupled with the growing workload (which often forced the company to keypunch the balance of its load outside the company) convinced the company to opt for the latter.

The company looked at a variety of manufacturers and then took a second look at an Eastman Kodak-leased Data 100 Corp. Keybatch system installed in Kenway's customer software support department. The system, which communicated with a similar device in Rochester, N.Y., was used to help develop Kenway software to run on a Kodak warehousing system at corporate headquarters.

"The remarkable thing about the system," Zickert said, "was that it had been installed for almost two years and required virtually no maintenance. And in Bountiful, Utah, service just isn't that easy to come by."

The Keybatch system was also the only one to support a high-speed printer for both upper and lower case printing. "That helped justify the cost of the system," he noted, "because we could not pull off the text editing printing that was being done on the service bureau's IBM 370/168 and do it on Data 100's 950 line/min printer."

The two terminals installed, Zickert and his staff began to grapple with how to operate in an IBM Time Sharing Option (TSO) environment where operators would make corrections through TSO and batch balancing would be done at the host.

"What we found," Zickert said, "was that the Keybatch system with its indexed sequential table retrieval capabilities could do much of the editing and batch balancing that we had expected of a host/TSO system. In fact, it eliminated 90% of the need for TSO."

Now, Zickert said, he feels he can satisfy all of his company's DP needs and doesn't have to go outside for assistance.

"When we originally set up productivity goals for the system," he added, "we recognized the potential retraining problems that might occur when going from keypunch to Keybatch. We assumed, therefore, that if we could increase productivity by 30% within a year, we would have met our goals."

Two and a half months later, Kenway's key-to-disk operators are producing in one day the same number of batches, under a Keybatch-formatted routine, that they formerly handled in a week, he noted. In a cash flow situation, for instance, purchase orders and invoices are now prepared within four hours, compared with the two to four days it used to take. "In fact," Zickert added, "we are rapidly moving ourselves out of a job."

There is little fear of that, however. Zickert's department is the hub of the company's financial operations, with the operators entering payroll, cost accounting and general ledger information as well as data for a financial modeling program. And the increased productivity meant Zickert and his staff could take on added responsibilities in data control to separate and distribute the appropriate documents as well as log in the various operations.

# Datamedia Announces CRT Compatible With Teletype

PENNSAUKEN, N.J. — A microprocessor-based, communications-oriented CRT terminal, designed to operate in a range of transaction processing and inquiry response applications, has been introduced by Datamedia Corp.

The Elite 3025A is a buffered Teletype-compatible CRT with a single-page video memory that displays 1,920 alphanumeric characters in a 24-line, 80 char./line format.

The unit offers a series of features that includes local edit, remote, batch, batch modified, format, format modified and transparent operating modes; host control of block transmit function in local or remote environments; asynchronous and optional isochronous communications interfaces; Bell 103 and 202 modem compatibility (201 modem compatibility with the isochronous interface); and switch-selectable EIA and optional 20mA current loop interfaces, a spokesman said.

Other features included are ten user function keys to facilitate access to application programs; no memory address space required to support screen enhancements; detached keyboard; and transmission rates ranging from 15- to 9,600 bit/sec selectable from keyboard, the firm said.

The Elite 3025A accommodates a standard RS-232C or optional 20mA current loop interface and supports full- or half-duplex, two- or four-wire internally or externally clocked asynchronous communications, the spokesman said.

The terminal is priced at $1,520 in quantities of 100. It will be available this quarter from Datamedia at 7300 N. Crescent Blvd., Pennsauken, N.J. 08110.

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## Bits & Pieces

### Wabash Introduces 'Universal' Tape

HUNTLEY, Ill. — A "universally adaptable" tape, designed to perform in a variety of temperatures, densities and speeds, has been introduced by the Wabash Tape Corp.

Wabash G Tape is coated 360 microinches thick and contains a lubricant that reportedly reduces static and variation in tape speed. It operates at 50°F to 110°F temperatures, at 0% to 90% relative humidity and can be stored at temperatures ranging from -10°F to 130°F, a spokesman stated.

G Tape is compatible with 556-, 800-, 1,600- and 6,250 bit/in. recording equipment, a spokesman said.

The tape is priced at approximately $18 for a 2,400-ft reel, the firm said from Wabash Tower, Huntley, Ill. 60142.

### Texwipe Cover Fits Front-Loading Disks

HILLSDALE, N.J. — A protective cover for front-loading disk cartridges has been introduced by the Texwipe Co.

The Discover is fabricated of PVC plastic designed to remain pliant and resist cracking. It has a toothless zip-lock fastener, according to a spokesman.

The disk cover costs $2.50 from the firm at Hillsdale, N.J. 07642.

### *Also Switches Vendors*

# User Takes Off With Upgrade

**By Brad Schultz**
CW Staff

ATLANTA — A large general aviation company here switched CPU vendors while engaged in a two-step upgrade from a small to a medium-scale system. The firm's upgrade followed an examination of products from three major vendors.

But the offering of all but one candidate seemed overpriced or lacking in performance or options in view of the user's special data base needs, a spokesman said.

Only Honeywell Information Systems, Inc. had the right equipment at the right price for Hangar One, Inc., according to Robert B. Welton, treasurer of the firm, which distributes Beechcraft airplanes.

"Burroughs Corp. did not have the overall capabilities and the future add-on capabilities that HIS did, and we had just been a frustrated IBM System/3 user. Besides, IBM's ideas . . . far surpassed HIS in pricing. They were way out in left field," Welton said.

Hangar One's unique functions led it away from the System/3 after a year's use, Welton said, noting his firm is an unusually diversified general aviation company. In addition to aircraft sales, it offers executive aircraft leasing and servicing operations.

**Hangar One uses 19 terminals in six cities for parts inventory, customer data and financial applications.**

"The problem with our System/3 was that it was a canned system with prepackaged software, and it was left up to us to fill in the variables. We wanted to say, 'These are our unique needs,' and have the vendor bring us the equipment, the software and the support we needed. And that is exactly what HIS did for us," Welton said.

The first HIS system used by Hangar One — replacing the System/3 — was a 2020. It was installed in 1974, then replaced by a 64/20.

"What we have now seems like night and day compared to 1974," Welton said, "but it was all we could have asked for then. We wanted to take the most basic data and put it in the computer once, then let the computer do the rest.

"We were concerned with technical support and software. We wanted our system to be a Hangar One system, and that's what we got."

The HIS 64/20 stores the firm's general ledger information and a customer information file in an on-line real-time environment for six locations in four southeastern states.

Hangar One's aircraft servicing operations include six "fixed-base" facilities that sell gasoline and provide parts and maintenance to private and commercial aircraft. These facilities are located in Atlanta; Chattanooga, Tenn.; Orlando, Miami and Sarasota, Fla.; and Birmingham, Ala.

Employees at the fixed-based facilities use CRTs to feed information into the system daily. For example, 17 salesmen input data every day regarding customer calls and responses, resulting in an updated file on some 9,700 customers.

The 64/20 has 160K bytes of main memory and is equipped with three disk drives, one tape drive, three communications lines, one 600 card/min reader, one 300 line/min printer and seven remote printers. Twenty-three CRTs are linked to the CPU.

Hangar One uses the system to match special customer demands for equipment with what is available. Soon after equipment comes on the market, a salesman can be ready to make a presentation.

The system also facilitates wholesale parts monitoring and budget-making — as well as airplane sales — for the firm.

Hangar One is developing "full financial" and on-line data entry software packages applicable to general aviation companies that will be marketed this year, he added, noting that the data entry system is now operational and in the final testing and debugging stage.

# Independent's Add-On Memory Accelerates System Implementation

Special to CW

CENTER LINE, Mich. — The Chrysler Corp. here has accelerated by more than eight months the implementation of a parts ordering system. The system, based on twin IBM mainframes, owes its fast start in part to the installation of IBM-compatible add-on memory, the user said.

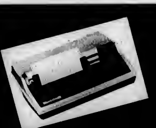
The auto manufacturer's Service and Parts Division, which controls the distribution of parts to dealers as well as the distribution of Mopar equipment, Chrysler's over-the-counter brand of parts, recently completed a six-month "Major Dealer System" pilot program utilizing the additional memory, supplied by Intel Corp.

The system is composed of two 370/158s with multiprocessor capability linked by dial-up lines to Digital Equipment Corp. Decwriter terminals installed at the dealerships. Through this centralized data network, Chrysler runs on-line order processing, parts inquiry and order status inquiry functions on a nationwide basis.

The system was originally designed by Chrysler DP personnel to utilize 2M bytes of add-on memory from IBM. "However, we discovered in our study of a number of add-on vendors that we could buy IBM-compatible memory at a significantly lower price," according to Dennis Barile, manager of technical services for the division.

"More memory would give us a faster response time, serve as backup to any memory failure

*(Continued on Page 42)*



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# User Credits Rapid Implementation to Add-On

(Continued from Page 39)

downtime and let us avoid complex modulizing of programs," he added.

Chrysler's memory comparison showed Intel's In-7158 memory the overall winner. Features that helped sway the decision included reconfigurations capability, built-in microprocessor error tracking and upgrade flexibility, Barile said. In addition, the Intel memory system was one quarter the price of comparable IBM memory, he noted.

"At the time, we thought IBM's memory was more reliable, but not enough to justify the cost differential. Another plus for Intel was its use of Sorbus, Inc. maintenance, which we had used with our old 370/155 and like," Barile said.

Since the evaluation, IBM has significantly lowered its add-on memory prices, but Intel's fully compatible In-7158 still costs less than half that of comparable IBM memory, he pointed out.

### Technicians in Tandem

Chrysler began its multiprocessor integration program in August 1976 by upgrading from the 155 to a 158 with 512K bytes of IBM standard memory and 3.5M bytes of Intel add-on. By the following Christmas, Chrysler was ready to add a second 158, the appropriate multiprocessor support package for both systems and another 1.5M byte of Intel memory.

During the Christmas and New Year holidays, IBM and Intel technicians took turns working on the two systems. During this entire period one processor was running at all times to carry on the division's normal DP functions.

"Throughout the installation time, the two teams of technicians worked well, and Intel personnel worked nights, days and holidays to speed the installation. It was quite complex, but there has been very little downtime since," Barile observed.

With the Major Dealer System ready, Chrysler spent six months of pilot projection time testing and adjusting the system.

"The benefit of twice as much add-on memory made it easier and faster for us to work with the dealer system. One visible advantage is the 1- to 2-second response time for our dealers, even at peak load time with 150 terminals around the country on-line," Barile said.

"The pilot program progressed very well, with dealer reaction very enthusiastic," he added. "Because of larger memory capability, the program is expanding as fast as we can get the terminals into the dealers' parts departments."

"Our system is designed so participating Chrysler dealers order parts through the central CPUs here in Michigan. This centralization of order processing means any dealer in the country has access to the status of all material in the country," Barile explained.

"Previously, a dealer called the local warehouse which, in turn, keypunched the order and input via local systems to the central CPU. Then the part was located and an order sent to the nearest depot with stock available.

"At the depot, the material was picked and finally shipped to the dealer," he said.

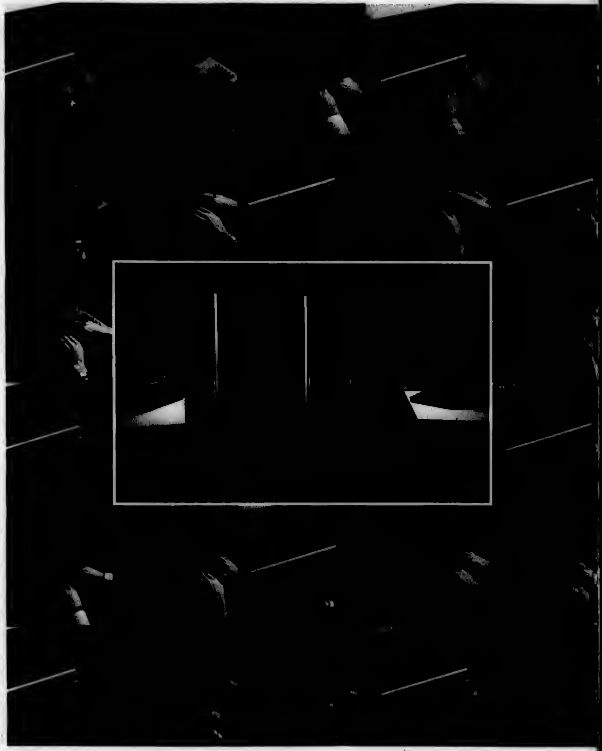
Dealers can now place an order, check on status of parts available nationwide and check the status of a particular order (where it is and when it should arrive) — all on-line, he added. Chrysler keeps 30 days of orders on-line for such dealer tracking.

The multiprocessing CPUs also handle three other major programs for the division: order processing for the company's 20 regional warehouses — here standard stock replenishment is handled through interfaces with warehouse-located Burroughs B2700 computers; an on-line system of 270 CRT terminals that performs such functions as special handling orders, parts inquiry and material activity tracking; and a Time Sharing Option system for program development and testing by the division's DP staff.

"We're on-line from 6 in the morning until 10 p.m. and running at 85% to 90% capacity throughout the day. The peak utilization period, 3 to 4 p.m., pushes the load to 95% capacity," according to Barile.

"With the planned expansion of the Major Dealer System, we probably will have close to 2,000 of the 4,700 domestic dealers on-line by the end of 1978," he projected. "Current memory will be adequate to support this expansion."

The two 158s are the only computer power for the entire division, but downtime from memory failure can be averted by varying the amount of memory off-line through an Intel feature that can swap to 5K to 12K of memory in and out. This is accomplished by manipulating the IBM multiprocessor support system, Barile said.



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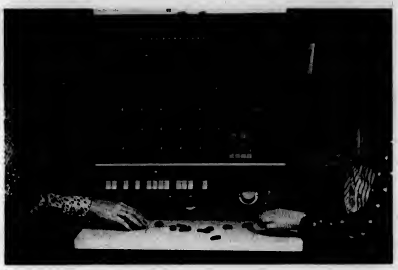

## Woolly Tale

*Researchers at Appalachian State University in Boone, N.C., predict the severity of the winter by studying the brown and black coloring patterns of woolly worms. The worms, along with researchers, are examining the maintenance console of a Univac 90/60 used to process the study data.*

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# Disk Exerciser Designed to Test IBM-Like Drives

FULLERTON, Calif — Wilson Laboratories, Inc. has a disk excerciser designed to evaluate IBM-type 2315 and 5440 disk drives.

The DX-500 provides a series of switch-selectable, preprogrammed exercises that help isolate and identify data errors, format errors and seeks errors in linked systems of one to four disk drives, a spokesman said.

Functions include restore, manual seek, incrementing seek and random patterns of incrementing, he stated.

The unit is reportedly capable of stopping on an error or indicating an error has been encountered while continuing to run.

Features of the DX-500 include Alternate Set, which allows alternating between any two desired cylinder addresses; and Data Pattern, which permits writing all 0s, all 1s, 0s and 1s or scrambled 1s and 0s, the firm said.

The unit costs $995 from Wilson Laboratories, 2536-D E. Fender Ave., Fullerton, Calif. 92631.

# Milwaukee Site Of UPS Course

MILWAUKEE — A course covering the theory and design of uninterruptible power supply (UPS) systems will be presented March 13-14 at the University of Wisconsin by its Department of Engineering and Applied Science.

The seminar, featuring a workshop on UPS applications, will focus on such questions as where and when a UPS is needed, how components should be chosen, how the system is designed and what the system maintenance requirements should be, a spokesman said.

Consideration will also be given to grounding and noise problems that are associated with the operation of a UPS system, he stated.

Registration for the course costs $135. Further information can be obtained from the program director at the University of Wisconsin-Extension, 929 N. Sixth St., Milwaukee, Wis. 53203.

# MFE Expands Transport Line

SALEM, N.H.— MFE Corp. is offering a digital cassette transport that reportedly has speeds ranging from 10- to 40 in./sec and a data transfer rate of 32 kbit/sec.

The 450B incorporates a "Tachlok" speed control system that provides a 1% long-term speed accuracy without the use of a prerecorded digital clock track, a spokesman said.

The unit is Ansi/Ecma-compatible and available in two data tracks, each allowing a data storage of up to 5.9M bits (720K bytes) per cassette, he stated.

The unit also features read-after-write heads and optical end and bottom of tape, the firm said.

The 450B costs $560. MFE is at Keewaydin Drive, Salem, N.H. 03079.

## *Scan, Nonscan Types Available*

# Improved Inks Sought for OCR Applications

SAN DIEGO — Inks used in optical character recognition (OCR) applications fall into two categories: scan and nonscan, Robert R. Green of Moore Business Forms, Inc. explained here recently, and the challenge that is facing the forms industry is to find an ink that can't be seen by the optical reader but can be seen without strain by the person filling out the form.

"This situation is further compounded by the fact that optical readers differ a great deal in the type of light used to illuminate the form in the OCR read area. Some systems read in the visible portion of the spectrum, others in the infrared portion and still others in the ultraviolet portion," he said.

Scan inks are inks that reflect little light when viewed by the scanner, thus appearing black to the scanner. Normally, black ink is used to print scannable data, since it provides sharper print contrast against the paper background. Other colors of ink may be used, although these colors must be chosen with extreme care, he cautioned.

Normally, alternate scannable ink colors contain a significant percentage of black pigment. Other designations for scan ink include nonreflective and read inks. "I prefer scan or read inks, since it's easier to keep them straight if you think in terms of how the scanner sees them," he explained.

"Nonscan inks are highly reflective and to the scanner appear the same color as the paper they are printed on, thus making them nonscannable to the optical reader and at the same time readable by the human eye. These inks are used to print guidelines or instructions that appear in the read areas of the form; they must be highly reflective so they provide little contrast with the paper background.

"Typical nonscan colors are blue and green for scanners that read in the visible portion of the spectrum; and yellow, orange and red for scanners that read the infrared (IR) portion of the spectrum," Green continued.

There are only a few scanners that read ultraviolet, and fewer new scanners are reading in the visible portion of the spectrum. The trend is toward scanners that read in the IR or near-IR range of the spectrum, he explained.

"This trend is good because it's difficult to come up with inks for scanners that read in the visible range because the human eye and scanner are both sensitive to the same range of colors. It's difficult to find an ink that the eye can see and the scanner cannot. I'm sure some of you have been around long enough to recall the problem with nonscan blue inks. When it was dark enough for human readability, it was too dark for the scanner," he said.

# Firms Offering Free Brochures

The following firms are offering free brochures:

Electronic Memories and Magnetics Corp. is offering a four-page illustrated brochure describing the compatibility of its add-on memories to IBM 370/158 and 370/168 systems. The firm is located at 3216 W. El Segundo Blvd., Hawthorne, Calif. 90250.

A pamphlet covering "Seven Reasons Why Your Company Should Own a Bell & Howell 3800 computer output microfilm (COM) system is available from that firm's COM Products Division, 1451 Quail St., Newport Beach, Calif. 92660.

A two-page bulletin discussing the series EPM Dual-Output AC/DC power supplies is offered by Intronics, Inc., 57 Chapel St., Newton, Mass. 02158.

### Dot-Matrix Printers

A four-page brochure describing the DP-1000 series dot-matrix printers is available from Anadex, 9825 DeSoto Ave., Chatsworth, Calif. 91311.

A bulletin discussing the Microcommand system and its hardware/-software package is being offered by the Information Control Corp., 9610 Bellanca Ave., Los Angeles, Calif. 90045.

Literature is available from the Research Products Corp. describing its line of Aprilaire humidifiers. A humidity calculation sheet is also included. The firm is at 1015 E. Washington Ave., Madison, Wis. 53701.

A six-page application brochure detailing the design of a data-acquisition system that can be constructed with four dual-in-line packages is offered by the Micro Networks Corp., 324 Clark St., Worcester, Mass. 01606.

A six-page brochure describing the features of the Verbatim TC-2000 and the TC-1200 data cartridges is available from the Information Terminals Corp., 323 Soquel Way, Sunnyvale, Calif. 94086.

A four-page data sheet discussing the internal time base, matched input filters, remote pen lift, transistor-to-transistor logic level remote control and paper alignment guides of the Model 7015B X-Y Recorder is available from the Hewlett-Packard Co., 1507 Page Mill Road, Palo Alto, Calif. 94304.

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# Nonprofit Group Reaps Savings in Data Entry

Special to CW

NEW YORK – The Institute of International Education (IIE) here has increased its data entry and communications efficiency while obtaining an annual cost savings of approximately $2,500 through the use of an intelligent key-entry system.

The institute, a nonprofit organization that administers various international education exchange and related programs, requires the maintenance of large volumes of statistical data amounting to over 60,000 records each month. IIE recently installed an Inforex, Inc. Model 1303 for use with its large-scale mainframe.

The present system configuration includes a control unit, six keystations, disk and tape drives and a 400 line/-min printer. The system is used for both data entry, validation and editing and for remote job entry to an IBM 370/158 mainframe at a service bureau in Connecticut. IIE is currently converting from an IBM 2780 communications protocol to IBM 3780, which offers a larger buffer and faster two-way data transfers.

The Inforex 1303 was chosen specifically for its combined data entry and remote job entry features, according to Bruce Barry, manager of systems and DP.

### Transmission Errors

"Before implementing the Inforex equipment," he said, "we were experiencing anywhere from five to 10 transmission errors per month that resulted in unnecessary extra costs for communications lines and CPU time. We have reduced that rate to only one or two errors in as much as three months. I feel that this improvement in performance is a direct result of the reliability of the new equipment."

Implementation of the system was prompted by a need to increase productivity, reduce error rates, eliminate the handling problems associated with punched cards and lower the overall cost of performing routine data entry and RJE tasks.

The 1303 replaced a Data 100 Corp. Model 74 RJE station and five IBM keypunch machines.

The 1303 has been enhanced with 309E software, which provides many of the features of larger systems to 1303 users. These include up to eight program levels, improved data manipulation and error correction capabilities and a job control language (JCL) library with a capacity of 44 job stream formats and the equivalent 200 to 300 JCL cards.

All job control instructions and transmission parameters are stored on disk and called up via a few keystrokes, eliminating the need to handle JCL cards.

### Greater Efficiency

The 1303 software has resulted in substantial improvements in overall efficiency. One major application for which this is true is the Scholarship Administration System (SAS). It includes comprehensive statistical data on over 25,000 scholarship grantees, including basic information such as name, date of birth, mail and home addresses and institution attended as well as financial data on tuition, textbooks, housing and related expenses.

This data constitutes 90-odd data elements which enables IIE to be responsive to sponsor-customized reports requiring both financial and statistical information.

The old keypunch equipment could accommodate only six program levels. To compensate for that constraint, IIE had to limit its grantee statistical input form to six levels. Data was keypunched, then a batch designation code had to be punched on a separate card. "Two problems resulted. First, there was always the obvious danger of dropping a batch of cards. If that happened, all of them had to be rekeyed and verified. Second, if the batch ticket card somehow got put in with the wrong set of cards, we ended up sending reports to the wrong people and *not* sending them to the people who had requested them. And, of course, we had all the classic problems of cards – overflowing storage areas and cards buckling every time the humidity went up," Barry noted.

The Inforex 1303 eliminates card handling and provides up to eight program levels allowing IIE to expand the formats used on source documents to match the information needs of various end-users within the organization.

Applications on the 1303 now include, among others, a university master file and the collection and formatting of data for various publications outlining educational opportunities and cost information.

The systems and DP department does not have a coding section. Source documents for these applications are coded in the field by non-DP personnel or the respondents to questionnaires and then sent in for data entry and processing. "Frequently the people filling in the forms will include more characters than allowed for in a given field. A feature of the Inforex software automatically signals the data entry operator when this is the case and allows him to enter an appropriate abbreviation," Barry explained.

Another feature provides for zero balancing, an important capability previously unavailable. IIE enters and processes approxiamtely 7,000 records each month for its general accounting journals. Prior to implementation of the new system, validation runs had to be performed on the mainframe. A

(Continued on Page 48)

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# Airline Uses RJE to Speed Jobs, Reduce Errors

ANCHORAGE, Alaska — When Wien Air Alaska's bank service bureau could no longer provide it with DP services, this Anchorage-based airline implemented remote job entry to handle reservations and developed its own accounting software.

As a result, Wien reported a reduction in job turnaround from as much as a week to a few hours and a reduction in batch errors from close to 30% to less than 5%.

Wien's service bureau had decided that, because of its own in-house workload, the airline would have to find other arrangements. Wien then examined the alternatives of going to another service bureau, installing its own CPU or using remote job entry.

Selecting the latter, the airline linked a Data 100 Corp. Keybatch system in Anchorage via satellite to a Continential Airlines IBM 360/65 in Los Angeles.

Wien opted for Continental's time-sharing facilities on the basis of cost effectiveness and past experience with its on-line reservation system, according to Mic Lowther, Wien DP manager.

### Equipment Choice

In seeking on-site equipment, the choices soon narrowed to IBM, Mohawk Data Sciences Corp., and Data 100, Lowther explained, since "not everyone does business up here."

He indicated that Data 100 Keybatch was ultimately chosen for such features as error checking, table look-up, range checking, in-line tables and its Indexed Sequential Access Method (Isam).

Wien's Keybatch configuration includes a 10M byte disk, a dual 800 bit/in. tape drive, 12 CRTs, two terminal control units and a 1,250 line/min printer.

The system has greatly facilitated such tasks as changing airline schedules, calculating flight pay and preparing post office reports on mail carrying — which Wien does to 152 Alaskan cities, according to Lowther.

Data entered in Anchorage is transmitted at 9,600 bit/sec to the Alaska Earth Station in Talkeetna and from there via RCA satellite to Point Reyes, Calif. (in the San Francisco Bay area).. Next, the data is sent over land lines to Continental's IBM 360/65 in Los Angeles.

### Backup Problem

One problem in Wien Air Alaska's remote location is backup sufficiency in the event of system failure, which the airline addressed by adding a secondary 10M-byte disk and software to run the system on either terminal control unit.

"While we are paying for a lot more equpment than we actually use," Lowther commented, "if we use the backup disk only five days later, it pays for itself."

Lowther also designed and implemented a system to manage Wien's tape library in Los Angeles. "It's been running a year now and we haven't lost a tape yet," he said.

## Group Cuts Costs For Data Entry

(Continued from Page 45)

single error could throw an entire batch out of balance, and that meant a time-consuming manual search.

The 1303 software employs six registers which allow accumulated balances to be matched against totals entered by the operator.

Although no statistics were kept on the cost or frequency of balancing errors prior to implementation of the Inforex system, Barry said. "It was certainly an annoying problem for us. By prebalancing all financial data during data entry, we've reduced our error rate to around 1% and saved a substantial amount of time and money."

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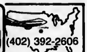

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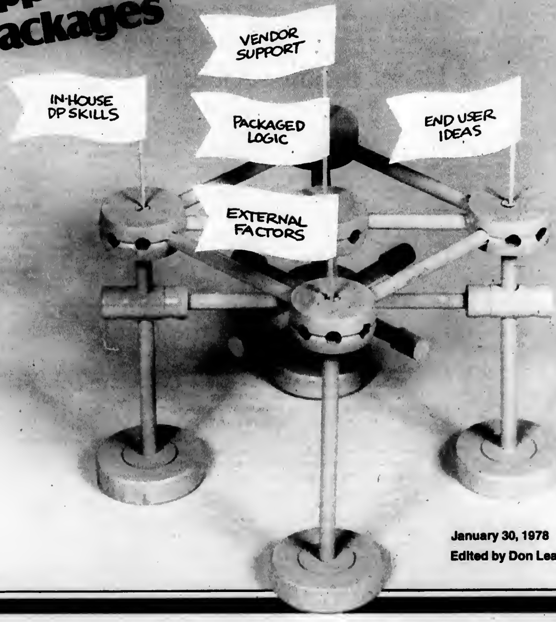

January 30, 1978

Edited by Don Leavitt

### Pros Far Outweigh Cons

# Package a Smart Alternative to In-House Unit

**By Gordon Brenne**
Special to CW

The design and development of computerized systems is a costly and time-consuming endeavor. Bringing in an application development effort on time and on budget can be regarded as an achievement. The ability to plan and budget a development effort with a degree of realism is yet another hallmark of achievement in the world of systems development.

The fact of the matter is that few business systems are completed on time and within budget. But this is just the tip of a cost overrun iceburg. Add to this the mounting systems maintenance costs often encountered after system implementation for application features not included originally.

Within this scenario, "proprietary software programs" (software packages) are rapidly becoming the reasonable alternative to informed executives for successful business systems implementation.

### Great Expectations

In the beginning, most internal system development efforts are greeted with enthusiasm by those who will benefit from them. Great plans are presented and great expectations are generated that this system will do all that is required of it and then some.

Dreams which were so cherished in the beginning soon become the mill stones hung on the neck of the designer, and users begin to sound like victims of an unnatural disaster. At the outset, application software packages were perhaps considered, but rejected as insufficient and unsatisfactory. Ironically, these packages are often rejected for the very reasons that make them a good solution:

- Ambitious Management Requirements — At the beginning of the project, did the requirements seem too ambitious for a packaged solution?
- Critical Time Schedule — Did this prevent examination of the range of package alternatives?
- Insufficient Staff — Was there no staff available to review the possible alternatives?
- Insufficient Expertise — Did staff available claim to be unfamiliar with application requirements and methods for evaluating packages?

These reasons, while rather general, reflect the basic problems encountered when trying to decide if packages are an alternative to internal development. Software packages are not a new idea, nor are they the best solution for every financial system application. There is, however, a wide range of package choices for most business applications on the market today.

A careful look at advantages and disadvantages of packaged application software brings the following points to light:

**Disadvantages**

- Hardware Transferability — Some packages will only work on certain computers and require tinkering when installed on other computers that have different operating systems. Developed systems can be designed to be compatible with computers you own.
- System Integration — Some custom

(Continued on Page S/20)

### In '77 Software Industry

# DDP, Security, EFTS, Minis Gain Support

**By Dennis Hamilton**
Special to CW

In the aggregate, 1977 was a mildly significant year for the software industry, but the trends that surfaced may indicate many of the industry's future directions.

The activity of 1977 can be fairly neatly split into the software trends and industry trends. All of the trends and mini trends are entwined to a degree, but it's important to delineate and tag them, if only to correlate cause and effect.

Among the more significant software trends were areas such as distributed data processing (DDP), software security, Electronic Funds Transfer System (EFTS) software, integrated systems and increasingly viable minicomputer software systems.

### DDP Detractors

It was once the idle fashion among the DP industry's philosophers to pronounce last rites on any new technology that happened to be heavily software-dependent. In the instance of DDP, the lament was that while the concept was enormously beneficial on paper, its practical costs were prohibitive for in-house developers. On the other hand, software vendors lacked the resouces and expertise to carry off the development of DDP software and, certainly as important, the ongoing support.

But suddenly, companies such as Inforex chose to concentrate on the software end of the DDP equation. If software was going to make or break the technology, it was not going to be neglected.

At the last National Computer Conference, Four-Phase introduced Vision, a comprehensive DDP software system built after extensive field testing. The problem of supporting all of that remote equipment and software is formidable, but it apparently isn't unconquerable. Four-Phase has staked its support reputation on its ablity to handle the job. The "grim reapers" notwithstanding, DDP appears to have a rosier future than it had only 12 months ago, thanks in large part to a software and support commitment.

EFTS software is part of another trend reflecting commitment. A couple of years ago, the vice-president of a Louisiana bank suggested that software vendors, removed from the EFTS battlefield (the bank data center), were not "even remotely capable of providing EFTS software" to the banking industry.

Some of the more EFTS-oriented vendors then effected coalitions with banks, refined the software on-site — with the input of the participants — and laid to rest the idea that their systems were devised in some isolated castle tower.

Tymshare, for example, worked with the National Bank of Commerce in Lincoln, Neb., on the development of a system, then purchased the rights to it. Thus the system being marketed is bank-developed, but refined, supported and marketed by a vendor. This appears to be the combination that will make EFTS software universally cost-effective and available.

### Security Trends

Another trend involves software security. In the current travails over privacy and security (again, separate but related subjects — if you don't have security, you cannot ensure

(Continued on Page S/6)

# Users Install Packages With Extra Care

**By Chester Mills**
Special to CW

Recent research studies in a large cross section of DP installations have found that some significant changes have occurred in the evaluation, purchase, installation and maintenance of application software packages.

The evaluations were found to be more thorough and in-depth, with much longer range systems specifications being developed and considered. End users were found to be participating in the preparation of the detailed short-term and long-term system specifications, as well as the actual evaluation of the software packages.

Benchmarks have been appearing more frequently than ever before as application software packages are being evaluated. The benchmarks have been utilized as key elements in the decision process to build or buy a particular application software system.

Among the key selection criteria which have been observed with respect to application software packages are:

- Is the package designed in a truly modular or structured (design and programming) approach?
- Does the package have current communication capabilities?
- Does the application package design and structure lend itself to ultimate conversion to operate in a data base environment?
- Does the vendor provide source code to allow for internal maintenance and enhancement of the package and if not, has its maintenance program proven to be satisfactory among referenced users?

### Purchase Considerations

In the area of purchase considerations, many potential buyers have required the vendors to contract the specific enhancements that may not currently be in the systems but are required by the end users.

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# Novice Users Must Take Time With Packages

**By Stephen A. Levine**
Special to CW

The first-time user working with a systems house or minicomputer manufacturer can encounter serious problems attempting to insure that his system reflects his real business needs. The use of an existing software package as a core capability is an appropriate and logical step, but invariably modifications will be required.

Modification of the software application package becomes a tug-of-war between the user and the supplier as a result of the different interests being served. This article points out a method which should help minimize these types of problems.

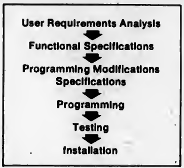
The sequence of events that should be followed in implementing a modified software package on a minicomputer is simple enough, as depicted in the accompanying chart.

Of course, adequate documentation, training and data conversion procedures must be added to the process steps outlined in the chart.

The requirements analysis sets down the user's needs in terms of functional applications and transaction volumes so that an accurate yardstick is available against which to match the application software capabilities and provide estimates of the system hardware elements. The functional specifications delineate the specific system input formats, output reports, data file layouts and overall information flow and all the modifications required to each of these areas to satisfy the end user's specific needs.

Finally, the programming modifications specifications translate the functional changes required to specific programming tasks necessary to implement the new standards. The project can then flow through the remaining steps to installation without major problems.

Neither the user nor the supplier can wait until installation to determine if everyone's expectations have been met. Instead, it is recommended that the functional specification be used to insure a more timely and accurate assessment of the scope of programming work required and the user's perception of the final product.


User Requirements Analysis
Functional Specifications
Programming Modifications Specifications
Programming
Testing
Installation

The above chart shows the steps necessary to modify a package on a minicomputer.

The functional specifications should be organized according to each of the areas of the user's business that are being computerized. All reports should be presented, along with input (terminal displays, etc.) formats, data file layouts and descriptions of all information flow and processing algorithms.

The professional staff of the systems house or manufacturer should hold periodic sessions with the end user's operating and management staff to review each business area of the functional specification and incorporate all changes, additions or deletions appropriate to the user's needs. This walk-through should follow a simulated system working session so that the user's best possible perception is generated in the process.

Once performed for a single business area, the end user will recognize the kinds of information the implementor needs to understand the precise nature of each change and, consequently, less gaps will occur in the communication process. This should continue for all the remaining areas and functional specification document should be updated to reflect in writing all the changes anticipated and finally approved by the user. At this point, the document can be turned over to the programming staff for review and generation of the programming modifications specifications.

The functional specification document, coupled with the end user walk-through, removes the mystique that usually shrouds this part of the minicomputer implementation effort and avoids the catastrophic types of encounters resulting in the "That's not what I wanted!" type of reaction when the final system is delivered, or the defensive posture of "We have no more programming funds remaining on the project!"

Although the process suggested here may take additional time and effort, it is the only truly high-confidence way of implementing a minicomputer software package.

*Levine is president of The EDP Corp., Newton, Mass.*

---

### *'Fly Before You Buy'*

# 'Test Driving' Packages Now a Possibility

**By Stewart F. Plock Jr.**
Special to CW

Would you buy a new or used car without driving it around the block? The same philosophy applies to software package purchases. If a minicomputer or software house can be found that offers its system via batch remote job entry (RJE) or remote time-sharing, such a system can be installed with no hardware investment, used for a finite trial period and evaluated during the trial for effectiveness.

This article describes examples where such a "fly before you buy" approach proved effective for two organizations: a manufacturing firm interested in implementing materials requirements planning (MRP) and a research unit seeking to install a data base management package. Both organizations used time-sharing services prior to making a package selection

## Minicomputer Application Selection

Smith Kline Instruments (SKI) in Sunnyvale, Calif., manufactures instruments and reagents for the health care industry. In the early '70s, SKI started a relationship with a local service bureau, eventually jointly developing many batch financial, sales and manufacturing systems on an IBM 360/30. Another service bureau was used for production planning.

Management became interested in developing an MRP system for SKI's Instruments Division in 1976. After a requirements definition phase, several MRP packages were identified as potential winners. In the final analysis, IBM's Ipics package was a contender as was an MRP system from a local minicomputer company, Interactive Applications, Inc. (IAI). IAI's systems were operational on HP 3000 hardware serving some 40 manufacturing firms in Northern California.

SKI decided to select IAI primarily because it could install a completely interactive (Extended Basic) MRP system in the plant while the CPU is operated at IAI's data center. During the structured six-month trial period, SKI installed and used IAI's inventory control, bill of materials, item master, purchasing and requirements planning modules.

"At the completion of the trial, we were able to identify specific quantified savings that we can expect to achieve from full utilization of MRP's power," Dick Lymon, Instruments Division general manager, said. "We are a lot more confident that these savings are real after having gained hands-on experience with the packaged system. Another significant advantage of the trial was that we were able to identify features of IAI's package that we wish to modify prior to bringing the HP 3000 in-house." Using this conservative "fly before you buy" approach, SKI now has scheduled delivery of the HP hardware for early this year.

In SKI's long-range systems plan, implementation of the data base or information resource management approach is expected. "Using IAI's system on a remote time-sharing basis and now bringing the system in-house was the fastest way for us to gain usage of a truly interactive system," J.B. Shah, SKI's DP manager, noted. "Yet we can already envision in the longer range transitioning from such a packaged system to a completely data base-oriented environment." The important point here is that the company is benefiting from a state-of-the-art application approach for use in future data

(Continued on Page S/4)

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### User Offers Advice

# Purchasing Software Requires Careful Planning

By John Saglimbeni
Special to CW

SCHENECTADY, N.Y. — Recognizing the need to replace our current antiquated applications software, and realizing we could not afford the time for in-house development because of our limited staff, Financial Computer Center of Eastern New York, Inc. pursued the path for purchasing applications software from outside sources.

Consulting *Datapro for Banking*, we found sound reasons which concurred with our thinking. They are:

- In-house software development projects generally take from a few months to several years to complete and are often subject to serious delays, whereas packaged software can usually be installed and made operational within a month or two.
- The cost of in-house software development is almost impossible to predict accurately and is often seriously underestimated, whereas packaged software is offered at a fixed price.
- Some in-house development efforts never reach completion, for a variety of reasons, whereas packaged software is generally a known quantity.
- Comprehensive documentation, often sadly neglected in in-house projects, can be demanded as a prerequisite for the sale of most software packages.
- There may be considerable resistance, in both management and technical circles, to the whole idea of purchasing applications software from outside sources. This resistance can usually be overcome by stressing the clear-cut economic advantages (if any) and the fact that the in-house staff will be relieved of the need to program mundane, commonplace applications and freed to work on more unconventional and challenging projects.

Having the problems well defined and all of the requirements determined, we proceeded to gather information about all available packages from 12 software houses. Once the survey was complete, we were able to narrow the field very quickly. Some packages were overpriced, some written in Assembler language, rather than ANS Cobol, and others were not comprehensive enough.

### Detailed Analysis

We performed a detailed analysis on two top contenders: A.S. Kranzley in Cherry Hill, N.J. and Florida Software in Orlando, Fla. We used the evaluation criteria prescribed by Datapro. We thought it was an excellent recipe to follow. Briefly, the 14 points used for the evaluation are as follows:

- Does the basic function of the package meet your needs?
- Will the package run on your computer system?
- What are the software requirements?
- How well do the detailed capabilities of the package match your requirements?
- Is the performance adequate for your needs?
- How flexible is the package?
- In what form is the package delivered?
- Will the package be easy to use?
- Is adequate documentation provided?
- What support will the vendor provide?
- What is the operational status of the package?
- What is the total cost of acquiring and using the package?
- What financial arrangements are offered?

Ease of installation and initial testing are very serious considerations. Although a package may be well known and thoroughly tested by the vendor, it is very desirable to use your own test data since the needs of users vary widely. The package should permit this to be done with a minimum amount of difficulty.

Vendor support should be looked at very carefully, especially during the testing phase when program bugs may turn up. It is advantageous to deal with a vendor that provides maintenance contracts. This will assure you of continued support and prevent the application from becoming out-dated.

We eventually selected Florida Software three times to meet our needs in banking application software.

*John Saglimbeni is assistant vice-president and manager-programming, Financial Computer Center of Eastern New York, Inc., Schenectady, N.Y.*

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# Users Can Try Packages Before Making Buy Decision

*(Continued from Page S/3)*

base design and development.

Data base package selection is often accomplished by forming a project team that proceeds to make a "paper" evaluation of several DBMS packages. The traditional steps followed in evaluating an application software package, including establishment of selection criteria, vendor and user interviews, "weighting" of various factors, etc. are employed.

### Lower Risk Approach

A lower risk approach involves contracting with a number of time-sharing or RJE service bureaus to experiment with data base management software. All of the major DBMS packages (such as IMS, Total, Adabas, IDMS, System 2000) are available from national service bureaus. The research computing center of a major chemical manufacturer used three different DBMS packages over a one-year period, paying for the expense of three service bureaus, but resulting in a clear understanding of the three packages used.

Selection and implementation of a data management approach and related software can be one of the most significant decisions made in long-range systems planning. By experimentation with various DBMS packages prior to purchase, all aspects of the package can be evaluated and compared with competitive systems.

More and more software vendors are offering their packages by the conventional purchase method and also via a nationwide remote computing service bureau. Also, specialized minicomputer software vendors are establishing time-sharing capabilities so their applications can be used in an experimental mode prior to purchase.

This very attractive manner of marketing systems gives the potential user the service while postponing purchase of software and/or minis. At the same time, the limitations of packaged systems can be clearly identified.

The "fly before you buy" approach to packaged systems is a good way to minimize the risk in minicomputers or larger mainframe packaged software selection.

*Plock is director, management information systems, Smith Kline Clinical Laboratories, Inc., Palo Alto, Calif.*

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# DDP, Security and Minis All Gain Support in '77

*(Continued from Page S/2)*

privacy), the software industry is again being sought for solutions.

Generally, software security systems are arriving as add-on packages that can be installed on any system; security enhancements for specific existing systems; new systems with security features built in (where a year or two ago they would not have been). In the New Software Products section of Interface magazine, there have been about 40 new systems introduced in the last year that could be categorized as one of the above.

There is also a move among the larger, more sophisticated companies to get away from the development of autonomous, nonintegratable systems. In their place comprehensive systems of an integrated, building block nature are being devised.

In the insurance industry, for example, Informatics' Life-Comm system takes on virtually every insurance company need. And in the manufacturing industry, Martin-Marietta's MAS-80 addresses more tasks than any other system of its kind.

> *'. . . The mini hardware sellers are encouraging the software vendors to participate with them. . . allowing each industry to develop, refine and support its respective specialty.'*

In the minicomputer software marketplace, where the problems were anticipated to be a leviathan, users are finding an increasing number of viable alternatives. International Computer Programs (ICP) currently lists more than 1,400 minicomputer software products — about 250 more than a year ago. The gravest fears of users appear to be about the flexibility of the systems and the support capabilities of the vendors, many of whom are small and somewhat constrained by resources.

However, there is a growing link between the hardware vendors and the software merchants, to the benefit of not only them but the buyer as well. The mini community is going to grow incredibly in the next half dozen years, thus sellers (of both wares) realize a viable long-term relationship is imperative. Consequently, the mini hardware sellers are encouraging the software vendors to participate with them, therefore allowing each industry to develop, refine and support its respective specialty.

Too, the software itself is becoming more user-oriented, which is vital to the non-DP-oriented mini user. Whereas only a few years ago there were only a handful of packaged solutions, many of which were inflexible and ultimately costly rather than cost-effective, the trend now — witness Logical Machine Corp.'s Adam — is to develop flexible, understandable and frequently user-manipulatable software packages.

Certainly there are other software trends — for example, the new emphasis toward on-line system scheduling as embodied in Software System Corp.'s Dimension V and Value Computing's enhanced on-line scheduling and production control system — but these are among the strongest. Their impact is certain.

Among the industry trends, it's been an interesting year too.

On the more ominous side, there are rumblings that the systems software industry may be in for some thorny times as the vendors try to develop programs that are useful for the new IBM machines. If the secrets of its software remain IBM's, as many vendors are inclined to think they will, the industry will be relegated to selling software to the 370-and-down market, which is huge, but for how long?

The fears have caused some secret caucuses and midnight strategy sessions, but the consequences are still nebulous. There may not yet be a perceptible trend (only with IBM could there be a "trend" with but one company involved), but it is nevertheless one of the greater possibilities.

On the other side of that coin, however, is a new union between other major hardware manufacturers and the software vendors. Honeywell, for instance, has contracts with some vendors — among them Cincom Systems and Information Systems Consultants — wherein they will sell the vendor-supplied software along with their hardware. The hardware manufacturers have begun to understand that the software industry, with its generally better programming expertise, can do them more good than harm.

One industry "non-trend" was the consolidation that never happened. A few years ago (and even today) the more redoubtable software institutions thought that in a few brief years they would absorb all their little software brothers and the industry would be composed of five or six giants. That prophecy, it seems, is diametrically opposed to what is happening. Rather than the field becoming leaner, it has been fattened up. Certainly there has been some absorption, but its rate is less than the rate of entry by new companies.

Another notable fact of life is the European invasion. The UK's software companies, for example, are bringing their products and expertise over here and are posing more than trifling competition for the domestic vendors. MSP and Altergo have become firmly entrenched in the U.S. and have aptly demonstrated in the last year that one need not be a Yankee to enjoy Yankee profitability.

Upcoming next year is the "Ist World Computing Services Industry Conference," which will be held in Barcelona, Spain. It will be a meeting of vendors from around the world, and the subject of corporate emigration to the U.S. will undoubtedly be a hot topic.

*Hamilton is an editor of International Computer Programs Inc.'s* Interface *publications.*

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## *If Packages Aren't Used*

# User Participation Vital in System Development

**By Bill Baxter**
Speciel to CW

There are several factors that contribute to the success of a systems development project. The most important factor, unfortunately, is the one that is often paid the least attention — the participation of the primary user. Indeed, it may be said that the success of the system is directly related to the involvement of the user.

This factor is often overlooked by management because of the highly technical nature of computer systems, which, it is believed, would prevent the user from playing an effective role in system development. This attitude by management causes them to assign the responsibility of system development to a computer specialist.

Often the computer specialist has grand notions that he knows what is best for the user and best for the company. He seems to lose sight of the fact that computer systems are not created for his pet theories on how the company should meet its information requirements. He forgets, even if he will not admit it to himself, that his job is to satisfy the user, by providing him with a useful system.

### Serious Mistake

This lack of regard for the user is a serious mistake, for although computer specialists are usually competent as far as technical matters go, they seldom have the background in business to design a system that fully meets the needs of the user — much less the overall goals and policies of the company.

When the system is presented to the user, a computer specialists may go to great lengths to assure the user that the system is technically sound. He talks in so many "buzzwords" about the completeness of the algorithms and the efficiency of the programs. He then proceeds to show the user the reams of documentation that he has produced. Much to the chagrin of the specialist, the user is not impressed with his technical wizardry and promptly tells him so.

After the specialist has finally regained his composure, he sets out to convince the user that the system is exactly what he needs; it is a common mistake to think that you can merely talk a user into being satisfied. The user knows what he needs and he will not be satisfied until he has it. Such a tactic only tends to aggravate the already expanding gap between the user and the computer specialist.

To overcome this gap in the development of the project, there must be a concentrated effort by all those involved; both management and the computer specialists must realize from the outset of the project that the primary user is the most important factor in realizing the success of the system.

User participation should begin with management assigning the best qualified user as the leader of the systems development team. However, this is not to say that the other members of the team are not essential — only that each member should perform a specific, assigned function. Above all, the user should be the leader of the team, for it is he who must be satisfied if the project is to succeed.

(Continued on Page S/16)

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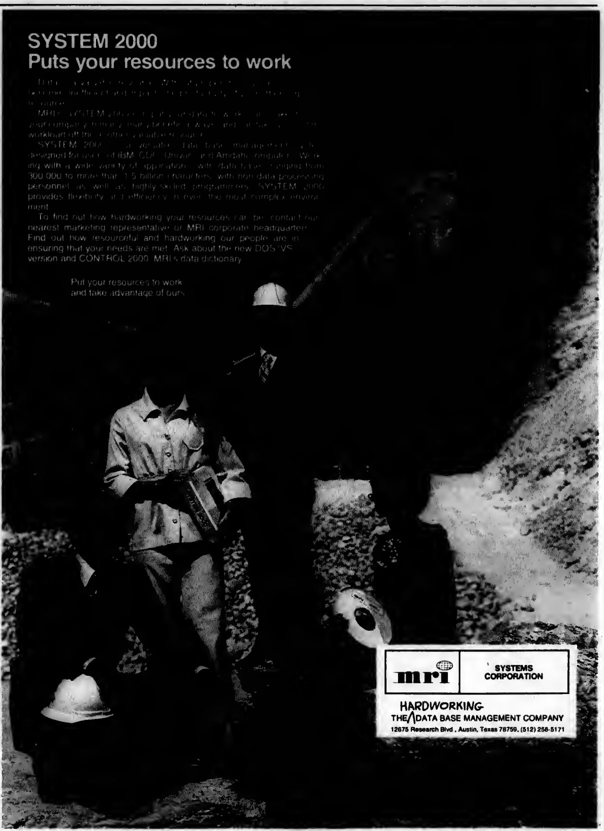

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# Experiment Successful for Package 'Guinea Pig'

By Jack Silver
Special to CW

GARDENA, Calif. — Industrial Polychemical Service is a 25-year-old manufacturer of solvent-based industrial adhesives and cements. We are one of the largest independent formulators and manufacturers of cements for plastic pipe in the U.S.

We presently manufacture 70 different products packaged in a wide variety of sizes and shapes of containers. As a result, we maintain an inventory of over 800 separate items stocked and shipped from six regional warehouses. Our sales are primarily handled by commissioned manufacturing representatives located throughout the U.S. and master distributors plus an internal sales management staff.

Our present DP system handles order entry, invoicing, inventory, accounts receivable, commissions and sales analysis. It consists of a Data General Nova computer, three video display terminals and four software packages, all supplied in a turnkey installation by Compusource Corp., El Segundo, Calif.

For five years, prior to installing our new system, we had a Phillips P358 magnetic ledger card system with internal memory only sufficient for our large volume products. We did not have an order entry system and before we shipped any goods, we sent an order to the billing department where 11 copies (invoice, packing slip and bills of lading) were generated on the Phillips machine.

> *'We could expect more problems and a higher risk, but we could also get more software tailored to our needs. Being adventurous by nature, I was intrigued by the proposal'*

Two years ago, we decided to beef up our marketing organization to correct some uneven sales and distribution coverage. We had strong marketing in the West and parts of the South, but other parts of the country were not being adequately covered.

We increased the number of sales representatives and opened five regional warehouses. This placed heavy demands on the small DP system, especially in providing more detailed inventory records and sales analysis. Just about all the system could do, on one shift, was accounts receivable. And sales commission and analysis reports were still being done manually.

Moreover, every time a computer operation was changed, we had to reprogram the machine. All this effort was time-consuming and costly. And demands for faster and more complete reports were increasing almost by the day.

We had several options. One was to add another shift and use the same equipment. But the machine's inventory control was limited and there was practically no way to analyze sales. And with a rapidly expanding sales force, these reports were critical.

Another option was to seek a service bureau to provide services on a contract basis. But we had no experience with these firms other than to run payroll. And over the years, our internal system had worked, even if it was slow and of limited capacity.

Gary Edwards, our assistant sales manager, asked if he could look into what was available in a minicomputer system with packaged software. His people needed pricing flexibility to meet competitive tactics, so they could "roll" with the punches when necessary. Edwards thought a new, more powerful computer could keep track of this data.

Furthermore, he recommended there be an order entry system to provide rapid inventory status reports to help in production scheduling. Such a report, he felt, could help us reduce late shipments caused by an unexpected rush of orders or by a periodic shortage of materials.

In the fall of 1976, Edwards and his staff prepared specifications for the new system. We wanted a computer that could handle at least three terminals, and be accessed by more than one operator at a time.

We also wanted a system that had dependable hardware, with no question of backup maintenance. We didn't want to buy either top-of-the-line or the cheapest equipment. We also wanted one firm to supply hardware, software and ongoing support. In other words, we insisted on single vendor responsibility.

### Proposals Studied

Over several months, we talked to three minicomputer manufacturers and three independent turnkey distributors. The manufacturers lacked the type of software we wanted. However, one distributor offered Data General equipment that gave us expansion capability without the need to reprogram, thereby saving our software investment.

A total of four bids was received. Two were from "turnkey" suppliers of Data General hardware. One firm was a small, one-man operation. The other was Compusource, a packaged software developer that had just started to offer the Data General line as part of its total system concept.

*(Continued on Page S/12)*

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## *User Cooperative Proves Value*

# Borrowed Package Revamps Hospital Inventory

**By Stephen L. Priest**
Special to CW

"Your inventory is 20% over what it should be!" "Why are critical patient care items out of stock?"

Such criticisms led Brockton Hospital, a 322-bed nonprofit community hospital located in southeastern Massachusetts, to install an inventory package. It provides the purchasing and storeroom departments with accurate and current information on inventory stock status.

The hospital's auditing firm had noted that the value of the book inventory and the physical inventory were not within an acceptable range. This led to a study by the Group Systems Engineering Program (GSEP) of the Massachusetts Hospital Association which showed the hospital's inventory level to be 20% greater than hospitals of comparable size.

The GSEP study recommended numerous procedural and organizational changes to the manual inventory system. One recommendation was that computerization be considered. Thus, the hospital decided to proceed with the implementation of a computerized inventory. A Materials Management Ad Hoc Committee with members from inventory user areas was formed to oversee the implementation.

### User Group Package

For previous applications the hospital had made successful use of the Cooperative Health-Care User Group (Chug) and its application catalog. Chug is composed of over 250 organizations in the health care industry that are working with NCR hardware. This valuable resource was again used and letters were sent and phone calls made to hospitals willing to share their experiences and application packages.

Two hospitals could meet the essential requirements of Brockton Hospital. Each package was then looked at with regard to documentation. Hospitals that had previously implemented the packages were also contacted. Consideration was given to data in the master file and ease of programming changes.

The final analysis showed Mother Frances Hospital, Tyler, Texas, could provide nearly all the committee's essential needs. Modifications to the programs could be made easily and the programming and systems documentation appeared complete. The inventory package had also been successfully implemented in at least three other hospitals.

Since Brockton Hospital is a member of Chug, Mother Frances Hospital provided the package at no charge. Brockton Hospital had developed other application packages that Mother Frances Hospital might someday wish to consider. Brockton also agreed to notify Mother Frances Hospital of any deficiences or modifications in the package and documentation.

The data system director presented the Materials Management Committee a detailed description of the format of each report. The committee evaluated the reports and made changes and additions to fit Brockton's specific needs. A detailed implemented schedule was then prepared and approved by the committee. Thus the committee was aware of the responsibilities of each department and how that department would relate to the implementation.

### Input Forms

Two of the existing source documents (purchase order,

*(Continued on Page S/14)*

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Peter X. Yates, Vice President, OLI Systems, Inc., Suite 909/910, 527 Madison Ave., New York, N.Y. 10022.

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# Users Study, Install Packages With Extra Care

*(Continued from Page S/2)*

Trends toward expending as much as 20% to 25% more for application software packages than originally planned has occurred when a package has a full range of features and facilities which would be required in the long term.

Many users have also gone to software systems with purchase terms allowing them to utilize the system on a trial basis for a specified period of time and then make a subsequent evaluation as to the acquisition of the package. This technique is employed more where secondary applications are being implemented.

Users now tend to take more time for the installation of all types of application systems than historical patterns have indicated. This is a byproduct of both experience on the part of the DP managements as well as the supplier in attempting to provide for more orderly, controlled installation of application software and to safeguard against the potential problems associated with the conversions.

The successful vendors in the marketplace have been providing extensive amounts of customer support, particularly during the installation phase, which previously was not the pattern. When successful application software programs have been implemented, this has been a major contributing factor.

As has been pointed out previously, the end user management as well as the operating staff has also been involved very early in the implementation process and particularly during the installation of the application software. It has been observed that in many cases the end user management has assumed responsibility for implementation of the systems.

### Software Maintenance

Maintenance of application software, both from the vendor and user vantage point, has seen some significant improvements over the past three years. Vendors, in large part due to their success, have found themselves in financial positions to provide much more comprehensive ongoing maintenance for existing application software, which includes enhancement programs.

The overall levels of documentation have moved from an overall rating of marginally acceptable, to good, to very good on the part of most application software users.

New forms of documentation and maintenance techniques have been provided by the vendors for internal maintenance of packages when source code is provided. Also, enhancement programs developed by the vendors have been approved by better scheduling and commitments to enhancements, as well as end user and DP management advisory councils to assist with the definition of various enhancement requirements. The last point concerning advisory or user groups has again been a key contributing factor when application software is rated very high.

### Life Cycles Extended

The life cycles which have been observed for application software systems, particularly major applications, have been extended from a previous four or five years to an average of seven or eight years. This longer life expectancy is a result of improved maintenance techniques, a more thorough understanding of the initial end user requirements and, in many cases, the integration of several applications into single application processing environments. Also, the rapid expansion and utilization of on-line systems for data entry, inquiry or real-time processing have also had a tendency to expand the life cycles of major application software systems.

It has been noted in several research studies that the application software packages developed over the last five to seven years, particularly those including on-line data entry, inquiry and multiple application interfaces, have been receiving extremely high marks in all areas.

In summary, application software systems for major or secondary applications are being considered more frequently by DP management and end-user management as viable alternatives to in-house systems development. Those organizations which have had success in selecting, installing and maintaining their purchased application software systems have conducted extensive evaluations and have extremely well-stated systems objectives and goals.

The make/buy decision with respect to application software is not any easier. In fact, it has become a more difficult task. However, in many cases the overall satisfaction with purchased application software systems shows continual improvement.

*Mills is president of Marketing and Sales Support Inc., a market research firm in Dallas, Texas.*

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## *With Service's Package*

# Janitorial Supply Firm Cleans Up Recordkeeping

LOS ANGELES — Janitorial supplies is one of the most growth-oriented businesses in the nation and National Sanitary Supply Corp. (NSS) is growing right along with the industry.

"That's why we decided it was essential to have a truly efficient computer system to handle the expansion in both the financial and recordkeeping ends of the business," Tom Lane, NSS vice-president for finance, said recently.

"We investigated many possible ways of handling this, including developing our own system. But in the end, the answer for us turned out to be Xerox Computer Services (XCS)," he said.

The XCS system used by NSS has had several dramatic effects on the company's business. For example, the master pick lists have helped cut truck loading time by 25%. Also, the firm's accounts receivable application has improved receivables by 10 days of positive cash flow, Lane noted.

Sanitary supply companies are in the business of supplying janitorial products such as waxes, detergents and other chemical cleaning agents and paper products to institutions and industry.

"It's essentially a sales, warehousing and delivery business," Lane said, "although the larger suppliers, such as ourselves, also manufacture many of their own products. Competition is based on both price and service."

### Survived Hard Times

NSS, founded in the inauspicious year of 1929, not only survived the Depression, but grew at a steady 15% to 20% a year — a growth rate that continues to the present.

"Growth is essential, but it also brings its problems," Lane said. "Keeping track of our stock, for instance, was no trick when we had half a dozen employees and a warehouse the size of a two-car garage. It's quite a different matter today, with eight branch offices, two major distribution centers with more than a 100,000 square feet of storage and an inventory that averages well over a $1 million."

By the late 60s, NSS recognized a need for some sort of change in its accounting system. Continued growth had made the company's old unit record equipment obsolete.

"A growth rate of 15% or 20% in a company that has only a few large customers might mean a relatively small increase in accounting functions," Lane noted. "But we have nearly 20,000 customers, so that any increase in our business produces an equivalent increase in accounting. It was just getting out of hand and we knew we had to act."

So Lane contacted all of the major computer manufacturers. He was not fully satisfied with the solutions that were offered, however.

"They all said they could handle our problems," Lane recalled. "And I'm sure they could. But the start-up costs were substantial and, worst of all, it meant adding a DP staff. I didn't care for that idea at all."

Then Lane heard about XCS.

"Xerox had just entered the service end of the computer business," he said. "As a matter of fact, we were the first customer they had for their new interactive accounting system."

The Xerox system, Lane found out, would operate through remote keyboard terminals located in the NSS business offices and tied by leased telephone lines into a large Xerox computer center in Los Angeles. A series of applications programs had been developed so a user could automate any part of his accounting systems. All applications would be interactive and linked, so entered data would automatically update the other applications.

"Xerox seemed to be offering pretty much what we needed," Lane said. "We were processing several hundred invoices a day at the time — we're up to around four times that amount now —

(Continued on Page S/20)

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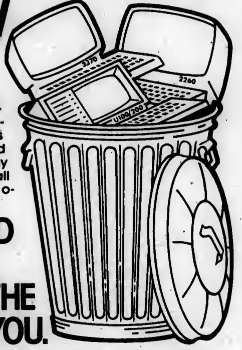

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# SAS Lets Bank User 'Do His Own Thing'

**By Benedict T. Lechowicz**
Special to CW

The Cleveland Trust Co. is one of 10 affiliate banks in the Clevetrust Corp., with assets of $4.3 billion. Cleveland Trust acquire the Statistical Analysis System (SAS) from SAS Institute Inc.

The bank first got the system as a performance measurement tool for its data management and report writing capabilities. Producing reports and plotting data from SMF, GTF, system log tapes, various data base log tapes and a hardware monitor were some of its first jobs.

With very little training, 13 other bank departments with data on the computer picked up SAS. In less time than it takes with other languages, they used SAS to write their own applications and reports.

For example, a trust officer with no programming experience searched for discrepancies in a large data base with SAS, generating a series of one-shot reports. This simple operation increased the reliability of the personal trust system and reduced customer inconvenience.

In our operations research group, a former programmer wrote a management reporting system in SAS. Using historical data, the system reports changes in various indicators from each of the bank's departments. This system was coded and debugged in SAS in three weeks.

Yet another SAS system, written by a management trainee, evaluates keypuncher performance. Now this system is used to bill each department for keypunching.

Although I have a working knowledge of Cobol and BAL, I prefer to code in SAS for my special-purpose projects because of the superb data management facilities. Data sets can be merged, updated, concatenated — part of the human engineering in SAS that greatly simplifies programming.

SAS is concise — the classic update takes only three statements. Since SAS is free-format, all three statements can go on one card.

The freedom from tedious and error-prone detail that SAS gives us lets us concentrate on the meaning of information — not on the mechanics of getting it.

*Lechowicz is system support manager at Cleveland Trust Co., Cleveland, Ohio.*

# Experiment Proves Success For Package 'Guinea Pig'

*(Continued from Page S/8)*

Its staff of 30 programmers was developing packages in our application areas and Compusource asked if we would become a pioneer of sorts. The company wanted us to act as "guinea pig" installation where it could test and check out programs. We could expect more problems and a higher risk. But we could also get more software tailored to our needs.

Being adventurous by nature, I was intrigued by this proposal. Compusource had the backup of a large programming staff, plus the depth of experience an individual programmer, working for himself, would not have. I also felt any package developer must have the financial resources and business stability to handle unexpected problems that were surely to arise. After checking several of their customers, I selected Compusource for the job, even though its price was not the lowest.

We then established a priority in which the packages were to be developed. Top effort was given to customer service programs, such as order entry, sales analysis and invoicing. All the accounting functions, such as general ledger, received lower priority. We also were willing to accept a general-purpose package to cover some functions, but insisted on highly customized programs for other tasks, such as sales analysis.

From January 1977 until July, we worked closely with Compusource to define the system, complete our research and perform system testing. We decided not to push for a rapid cutover of the old system, but to take our time and do the job right the first time. We had to renumber all 800 products, assign new codes for customer accounts and reorganize both the customer and product master files.

There were also organizational problems to be solved. The existing Phillips system would continue in operation all during development of the new system and the final cutover would not be in phases, but would occur at one time. Moteover, we established a firm deadline that Compusource must meet. This was dictated in part by a dwindling supply of old invoicing forms, and printing both old and new forms would have been much too costly.

In mid-July, Compusource installed the new system and the old one was phased out. There were some problems because of misunderstandings about our requirements as they passed from one programmer to another. Fortunately, Compusource assigned a single project manager to our job for the full term. He was a solid professional who solved each problem as it arose. As of mid-December 1977, our system is 95% complete and running satisfactorily. We are now fine tuning the operation.

In all fairness to Compusource, even though our installation and checkout time was lengthy, we took our time to minimize errors, mistakes and problems. With their help, we did just that. We now have a system that is working just about the way it should, providing us with the type of management information we need to run a successful business. And Compusource developed some excellent packages as a result of Industrial Polychemical Service becoming its "guinea pig."

*Silver is president of Industrial Polychemical Service, Gardena, Calif.*

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# User Borrows Package to Overhaul Inventory

(Continued from Page S/9)

issue requisition) were found to be sufficient except for completeness of data. The necessary data to satisfy computer input requirements was put on the forms as of July 1, 1977. It was decided that a receiving slip had to be developed to notify DP of additions and deliveries to inventory and the system would produce a report listing all outstanding purchase orders.

It was also necessary to design a maintenance form so that changes could be made to the master files. Additions of new inventory items, corrections and other alpha changes are examples of information that would come in on the form.

Defining all source documents before any parallel runs made it easy for purchasing to become accustomed to completing all input forms and the data on the forms could be used in testing the system's programs.

The Mother Frances Hospital inventory package was put on Brockton's 32K NCR Century 200.

The purchasing and storeroom departments provided test input for receipts, issues, purchase orders and file maintenance transactions. Modifications in the package were made and the documentation updated.

After a satisfactory run with the test package input and output, the reports and system procedures were presented to the committee for final approval.

A physical inventory was taken September 1, 1977 and put on the computer. A hospital-wide parallel end revealed discrepancies in the purchasing department's stock status 5 in. by 5 in. card file. Investigation showed the time delay between actual issues and posting to the card file caused many discrepancies. Also, many issue units in the storeroom did not conform to the card file issue units. Stores would issue pencils singly, for example whereas purchasing was expensing them as dozens.

On October 1, 1977, an end-of-year physical inventory was taken and purchasing's card file physically removed from the area. The computerized stock status report would now be gospel.

The second day of the "live" status revealed below zero status for many items. Investigation showed items being requisitioned were not being issued, but were being expensed to departments. Also many of the departments were signing for items not received. Again, the problems noted by the auditor and GSEP were found.

An extensive edit routine included a check to insure that ordered units agreed with the system's master file receipt units.

### Output Reports

The data entry time for inventory data was set to conform to storeroom and purchasing hours. Thus, the system was run five days a week and reports are prepared overnight.

The edit report is first reviewed by purchasing to insure that all control totals balance properly. The errors are promptly located and hand corrections made to the necessary reports. If a receipt item was not accepted by the computer, for example the stock status reports would be manually adjusted to reflect the correct inventory. The corrections are submitted that evening to the computer.

The stock status report is used by the purchasing agent to provide information for ordering items and discussions with vendors. Selected items are also chosen by the purchasing agent for spot inventory checks.

The open purchase order report is used to provide status on the delivery of all items. The standing purchase orders are also designated on the report.

The lead time report provides the purchasing agent with items at or below the reorder point.

A receiving control report is used by the receiving area to acknowledge items received that day. This was one of the modifications made to the Mother Frances package. Essentially, the report shows all open purchase orders by vendor and the report is also the input document to DP at the end of the day.

At the end of the month, an expense distribution report by department is printed. This shows the item ordered by a department, frequency of order and the total money charged to the department's budget.

On a quarterly basis a negligible activity report is printed to show items not requisitioned during the last three months. This report is used by the standards committee to determine whether the item should be deleted from inventory or substituted for another item or whether it is simply a seasonal item.

Another quarterly report, the issues and receipt report, is used by the purchasing agent to determine order quantities based on past usage.

An analysis report is generated quarterly to allow administration and purchasing to see the big money items. Controls can be applied to monitor the large expense items, whereas looser controls may be applied to the low expense items.

The system has been operational since October 1, 1977 and the physical inventories are now within acceptable levels.

The expense distribution report made many department heads open their eyes as they saw item by item what was being charged to their departments. The frequency of requisitions amazed many people. The type of items being requisitioned also was cause for concern as many were not related to the area doing the requesting.

Changes were made in the materials management department's structure and areas of responsibility. Now there is no passing the buck - all deficiencies must be accounted

(Continued on Page S/16)

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## *Survey of Users Finds*

# Vendor Upkeep Major Factor in Acquisitions

**By Bruce Cross**
**Special to CW**

The fact that American business people are buying packaged software does not need to be established. Each year the number of packages reaching major sales milestones increases at an ever increasing rate, and the number of companies buying their first packaged product seems to expand at a delightfully alarming clip. Many companies are working on their second or third dozen "packaged problem solvers." All seems to be in place to assure tremendous success for this new and most significant element in the fabric of our automatable world.

Much attention was given in the early days of the software industry as to why peole should buy packages. Hoards of polished peddlers hit the streets lucidly extolling the logic of shared development costs, shortened implementation periods, superior product, superior installation support and so on, ad nauseam.

However strong the message, the facts of the matter were that for each first-time software user, logic played only a secondary role in the decision-making process. The pressures of aggressive time schedules precluded the favored in-house development or the failure of the development team to meet both time and capability targets forced the use of a less than desirable but demonstrable solution in the form of a packaged product. Rational buying motives seldom surfaced in any form other than lip service during the early days of this industry.

### Questionnaire Circulated

It was this background that prompted a mini survey to determine what the motivation for buying software is today. To that end a questionnaire was circulated among the participants at a recent AMR seminar entitled "How to Buy Software." We asked for input as to the basic advantages of acquiring software from the outside as an alternative to in-house development. The audience, made up predominantly of DP professionals from companies ranging in size from very small to very large, had some interesting reasons for spending their time and money in such a session. A recap of their responses might give new focus to the software industry.

Approximately 80% of the audience had specific involvement with the DP departments of their respective companies and fully 60% of them had direct involvement in acquiring packaged software in the past. The major reason for their participation in the session was to sharpen their skills in the acquisition process. They had purchased software at least once and wanted to do it again ... and again! Our question was "why?"

In the early years of proprietary software the rationale of major importance was that of time, it is easier to get a prepackaged program up and running than to start from scratch. This still ranked very high (as one might assume), yet to those who had actually installed packaged software the number one reason was the availability of vendor-supplied support over the operational life of the program — some call it maintenance.

These respondents indicated an ever increasing percentage of their productive programming force was dedicated to the maintenance of home-grown systems and this trend was the major target for their interest in packaged software. Logic dictates this should happen as more and more systems have been brought into production, but the full impact is just now coming to light. Minimum figures indicated that fully 50% of the programming resources were committed to maintenance activities and some indicated the percentage was approaching an unthinkable 90%.

The size of the commitment to maintenance was not the only problem with in-house developed systems. Staff motivation for maintenance activities was less than positive and the "missed opportunities" for new projects because of people shortages were also key. Programmers want to be building, not fixing, and the list of applications to be installed seems to be increasing without end. The use of programming and management talent in the maintenance function seems to be a drawback of significant proportion.

As we trace the development of the software industry over its not too lengthy history, one of the major fears users had in stepping into the software marketplace was the fear of losing vendor support over the long haul "What happens if you are not around to support us five years from now?"

But our questioning unearthed an interesting fact of life: the expertise and in-depth knowledge theoretically gained by in-house development has little practical residual value over an extended period of time. Can the outsider do something better? The buying motivation of this group would bear it out.

The vendor of packaged software must provide maintenance service if his product is to remain competitive in the marketplace. Additionally, this maintenance function dictates architectural characteristics for the product that make this function more economical. Combining these factors with a staff with full-time, positive involvement with the product day in and day out, attracting and retaining motivated personnel seems to be a logical by-product, where the in-house staff finds similar activities negative.

The conclusion that can be drawn from this mini study of motivation is that there is a new found interest on the total life cycle of a system. The focus goes beyond the usual com-

*(Continued on Page S/20)*

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# User Gives Speedy Conversion High Marks

By Leilani Nye Johnson
Special to CW

SANTA CLARA, Calif. — Memorex Corp. has realized many benefits with the installation of a new automated fixed asset system. Manual journal vouchers have been reduced by a monthly average of 65%. Time to perform maintenance transactions has decreased about 70% monthly because minimal information is required by the new system to perform transfers, adjustments, changes, etc.

The report request feature has also proven to be an excellent management tool. Reports may be selected and sequenced in a multitude of ways and may be generated at any time without duplicating depreciation calculations.

The source documents used to update the master file are logically and aesthetically designed, thus providing ease of preparation for the user and reduction of keypunch errors for the DP department. This ease of use is critical at Memorex, where transaction volumes are currently running in excess of 5,000 a month.

When the decision was made at Memorex to upgrade its automated system, the evaluation responsibility was shared by the Property Accounting Division, Information Systems Division and the DP Department. The principal evaluation criteria was ease of use, with full accounting capability and DP efficiency and maintainability defined as absolute requirements.

### Final Selection

After extensive evaluation, the Property Information & Management Systems (Pims) from Fortex Data Corp. was selected. Pims was implemented at corporate headquarters here during November 1976, in what was for us record-breaking time — within 12 calendar days of contract signing!

A new master file was created in less than two days. Conversion to Pims from the old automated fixed asset system was completed in eight working days. During one brief three-hour meeting, the old file layout was reviewed and the required date for conversion was selected.

User and DP education were included in the conversion period. The combined dedication and knowledge of the vendor and user are the factors that contributed to the successful and speedy installation.

An important part of the conversion was training user personnel thoroughly but as quickly as possible. The Pims documentation is very complete. Chapters are dedicated to the various transaction codes, system capabilities, report identifications and functions, preparation of source documents, system tables, edits and error messages plus other important chapters.

Fortex provided exceptional technical support personnel who conducted the user education seminars. Their technical expertise enabled them to answer questions pertaining to source documents as well as system capabilities without the aid of reference manuals. As a result, user education was completed in 10 hours.

User personnel began processing Pims source documents weeks before the new master file was created. October updates were processed against the old fixed asset system, and November was processed against the new Pims master file.

The standard closing schedule was met. No loss of time was experienced due to conversion to the new system.

*Johnson is manager, corporate property accounting at Memorex Corp., Santa Clara, Calif.*

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# User Role in Development Crucial

*(Continued from Page S/9)*

Psychological factors also have a direct bearing on the success of the system; it is here that the user will prove to be very significant. By participating actively at the outset of the project, the user begins to feel that the system is really his, and this enthusiasm invariably rubs off on his subordinates.

It is virtually impossible to install a new computer system without making some kind of operational change in the user's area. However, the adverse effects that such changes have on the morale of the users and the acceptance of the system will be minimized by the enthusiasm that you have engendered by promoting user participation in the developmental phase of the system and by continuing open communications with the user area.

When the project development team comes to grips with the task of uncovering the layers and layers of minute detail involved in designing a viable system, the user can once again make a worthwhile contribution. He can provide a valuable insight into the inner workings of the system, helping to make certain that no minor details are overlooked.

The user's superior insight comes from specific working experience that the computer specialist seldom acquires. The user can draw from his wealth of unique work experience to point out those areas that need improvements.

While we cannot assume that the user can solve all of the problems in systems development, neither can we assume that systems development should be left exclusively in the hands of the computer specialists. So don't leave the user out; he is a valuable resource that must not be wasted.

*Baxter is a systems analyst at Corpus Christi Bank & Trust Co., Corpus Christi, Texas.*

# Borrowed Package Helps Hospital Update Inventory

*(Continued from Page S/14)*

for. The open purchase order report revealed many purchase orders were outdated. Many order units were not compatible with those received.

Through the lead time report the minimum stock levels are being adjusted to reflect true vendor delivery times and safety stock levels. It is expected that significant decreases in the inventory level will result. The complaints of nursing as to out-of-stock items has disappeared. Good reorder points and control over all issues and receipts insures correct and useful reports.

The rewards of an accurate and timely inventory are reflected in financial savings, as the hospital's inventory level continues to fall. In addition, the wasted man-hours necessary to deal with complaints and place hurry-up orders have been minimized.

*Priest is director, data systems, at Brockton Hospital, Brockton, Mass.*

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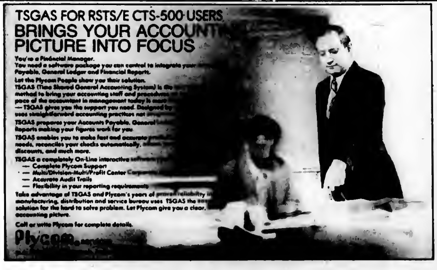

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## *When Looking for a Package*

# Buyer Needs Commitment, Not Just Committees

**By Chet Domoracki and Larry Chute**
Special to CW

When properly implemented, application software can be of substantial benefit. But unless a major commitment is made by the using company's top management, successful implementation can be an elusive, often frustrating experience.

The technical staff of Software International Corp. has installed more than 1,300 application software packages around the world, ranging from highly complex manufacturing and financial reporting systems to relatively simple small-computer basic accounting systems. In all that work, two facts have become more and more evident.

First of all, the client must set up and use project teams if all departments — DP and users — are to utilize the system most effectively. Second, top management must be committed to backing the project team so that implementation is accomplished as quickly, smoothly and thoroughly as possible.

Without that much effort by the using organization, the value of any work by the vendor is at least jeopardized.

The project team must include a manager and a key individual, both from the user group, the latter being responsible for the ongoing operation and use of the new system. In addition, a systems analyst and programmer are required for the installation and interface design.

The project team should be kept small, no more than five individuals dedicating 100% of their time to the project. Additional personnel may be temporarily added to complete a particular task.

The project manager needs to be a senior individual within the user organization who has the full confidence of and delegated authority from top management. Even though decision-making must lie with the project manager, the commitment from top management should not be minimized.

If top management is less than strongly supportive in the project and in its choice of the project manager, the project has little likelihood of success.

Top management will require weekly progress reports from the project leader. The team's schedule of tasks, assignments and milestones should be frequently reviewed by top management. A regularly scheduled weekly progress meeting of the project team to be attended by a senior user is usually sufficient.

### Tasks and Timing

The project team has to take the functional specifications and carefully define the schedule and timing to accomplish the tasks required. The key point is to plan the use of the system prior to the installation of software.

For example, accounting structures and associated computerized or manual financial systems frequently require substantial change when installing a general ledger. Less extensive change may be enough if upgrading a computerized payroll, accounts payable, accounts receivable or a cost system.

However, the change from the manual system to any computerized system is frequently traumatic, especially to the clerical help who must use it every day. The resistance to change can range from subtle to downright hostile. The project manager who is aware of the fear of change and tries early in the project to effectively deal with it can only aid himself in a successful implementation.

The easiest way to determine how to use the new system is to analyze and document the use of the current system. The analysis and documentation phase may have taken place during the decision-making period for the selection of the new system or it may have already existed. In any event, it is important to know what exists prior to designing what should exist. During this step, the tasks and time frame are identified.

### Flow Chart Necessary

It is necessary then to flow chart the new system's input and output and its supporting interfaces. All the subsystems, translation tables and files that are to be used must be identified, located by data set name and means of access established.

Once the location and flow of external data into the new system has been determined, the next step is the integration of the output. The questions to be answered include: What should the output record look like? What information should it contain? Where should it be stored? Should it be reformatted or translated? Should the file thus created be saved for a certain length of time? What output documents are required?

The detailed answers to these and related questions form the basis for a clear definition of the implementation tasks and the time frame for the tasks to be completed.

Any system plan has to include room for expansion whether it be numbering schemes, disk space or enlarged record

*(Continued on Page S/18)*

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# Commitment, Not Just Committees, Necessary

*(Continued from Page S/17)*

sizes. In financial systems, the planning and design of a chart of accounts, vendor master file, customer master file, employee number file or master rate tables require careful review.

It is better to extend the planning time required for a proper numbering scheme than to dump the current files onto the new system and worry about it later even though the new system may work.

The best time to expand the chart of accounts or other master files, for example, is prior to the initial "create process" on the new system. It is worth the additional effort and time to properly implement the new system to fit the preassigned functional objectives and their expansion implications.

### Education & Training

A major requirement for successful implementation is the education and training of all levels within the user's organization. A class on the system overview is desirable for management and all clerical help. Detail classes on all user-oriented aspects of the system from input to output are necessary for the end users, in addition to classes for the DP staff.

The clerical personnel must be included as early as possible during the detail implementation stages. Indeed, they should have been consulted prior to the formulation of the functional specifications. Their input and comments are crucial to successful installation. After all, they are the ones that will be most directly involved with using the system.

The testing and parallel running of the old system in comparison with the new system remains the best way to ascertain the integrity of the new data base.

### Alternate Testing Approach

But there are conditions that sometimes make this approach impractical; such as the old system's timing in terms of cutoffs and reporting is completely different than that of the new system; new data calculations are performed on new data sets that were not performed in the old system and are complex to duplicate in the old system; or, most commonly encountered, there is insufficient personnel for a parallel run.

An often successful alternate approach is for the project team to develop a mini test data base prior to implementation to exercise the new system in a controlled manner through multiple processing cycles. Bugs will be found, interfaces will not work, data will be lost or inaccessible. Frequent system backups and restores of files will become necessary.

Running the new system in either of these modes for three months will usually identify most of the problems and allow time to make appropriate corrections to them. With proper backup and restore procedures, the dangers of losing irreplaceable files will be minimized.

Once the cutover to the new system is done, vigilance is still mandatory as there is no simple way to isolate data problems. All output has to be closely scrutinized for error messages, condition codes, edit problems and system failures. As long as the maintenance and input group is small, centrally located and trained, they will be able to carefully scrutinize all input and output.

The time to sit back and reflect upon the successful implementation of the new system is when the system has run trouble-free for several months. Then one has to determine if the new system has met all the expectation criteria.

With a good schedule and plan, proper training, hard working team personnel and sufficient testing of software, most of the expectations should have been met. The last step in the project is to find additional work for the system to do, and there will be plenty of it.

*Domoracki is vice-president, small systems group, and Chute is in the research and development group at Software International Corp., Andover, Mass.*

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# Dental Supply House Gets 'Midas' Touch

Special to CW

SUNNYVALE, Calif. — Not long ago Bill Sautter and Ron Mowrer found their 1,500-part inventory was getting out of hand. "That's how it was for quite awhile," said Mowrer, who is vice-president and co-founder of Spica, Inc. "We'd solve one problem and create another. I guess we'd have to blame it on success — as our sales grew, we just couldn't keep track of everything with our small staff.

"So we had to make a decision — add people to do more manual recordkeeping or invest in some automation. Well, we made that decision by getting our own computer, one we could time-share among a number of our employees, and now we're creating solutions instead of problems."

The company is the result of some brainstorming by Mowrer and co-founder Sautter. Five years ago, the two were distributing nitrous oxide gas valves to dentists for another company when they concluded the equipment they were selling was both over-engineered and overpriced. After analyzing the market and doing some soul searching, they decided to found their own company to produce a better type gas delivery system for dentists and to satisfy the product demand they knew was there.

### No Laughing Matter

Now after five years of work, sales have climbed to about a million annually and Spica offers a line of 125 gas delivery system components. So the delivery of laughing gas has become a serious matter around Spica's plant here.

"Since we knew we should have several people inputting data for inventory control," Mowrer said, "we started by considering a time-sharing service and figured if we got time-sharing for our inventory, we might as well go all the way and enter our general ledger, accounts receivable and payable and other functions.

"Finally, we decided we wanted a software package that would do all that, but on a computer that would belong to us rather than someone else. So we started shopping for a time-sharing computer system."

The package Spica found that "did all that" — and more, as Mowrer was to later find out — was Management's Interactive Data Accounting System (Midas), software offered by DLM Enterprises of Chicago, Ill. for operation on the time-sharing system manufactured by Basic Timesharing, Inc. (BTI), also located here.

When Spica installed the BTI 4000 in December 1976, one terminal was placed in the office of the production manager, and two more were installed in the accounting department. Later, the company added a portable terminal in its engineering department. Mowrer frequently carries that terminal home for programming, which he does by dialing up the BTI 4000 at the plant.

But what about those inventory headaches that sent Spica looking for some automation in the first place?

"Before getting Midas, we had our inventory controlled by a cardex file and there was a lot of posting and notation work to do. It took so much time, we seldom had a good idea how many parts we needed to reorder," Mowrer said. "Now our production manager easily takes care of both inventory control and purchasing on his own terminal. Once the data is entered, Midas does all the processing.

Midas also provides complete production picklists, Mowrer noted. Each list includes each component part number, description, quantity ordered for production, stocking, unit of measure and the bin location.

Other vital management information is available at the touch of a button. "We can get a statement of sales at any time or we can get a breakdown of sales by product line and product codes," Mowrer said.

"Before we got Midas, we had all our sales lumped into three categories. We now have 28 categories and we have a really good idea each month how much business we're doing in each category. Or we can get a profile of shipping through the year on any one item we make. It helps us plan future business along with how many units we need to build at what time," he said.

"With Midas," he added, we're getting three to four times more management information. It all helps."

### Self-Training

Although nobody at Spica had experience with computer programming, it wasn't long before Mowrer, trained as an electrical engineer, taught himself Basic-X and started developing cash flow and depreciation reports on the terminal he took home at night.

Prior to Midas, one person in the accounting office was employed typing statements and billing for the company's 227 customers. Now that's all gone.

"The accounting capabilities of Midas are fantastic," Mowrer said. "With umpteen different books around here — purchase registers, sales registers and so on — we had a fairly sophisticated manual bookkeeping system for a small business. But Midas handles it all.

"For instance, when our bookkeeper sits down to do accounts payable, she can flag an account by date, amount, vendor or any other classification. Then she hits a button and the system prints out all the checks."

Spica is buying the BTI 4000 and Midas software on a lease-purchase plan. That means it can use the BTI 4000 computer 24 hours a day, seven days a week. For Spica, the lease-purchase plan is much cheaper than paying a time-sharing service on a per transaction or hourly rental basis.

"Even after several months of working with Midas, we're still finding capabilities we didn't know we had," Mowrer said. "Overall, it's a little too soon to tell what the exact figures are going to be, but I can see Midas is increasing our efficiency and profits and saving on our overhead. The system allows us room for expansion, too."

Spica's president, Sautter, has a different view. "With Midas organizing things, there's a little less excitement around here," he said. "But I'm learning to live with that."

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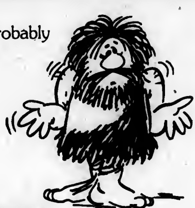

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# Package Good Alternative to In-House System

(Continued from Page S/2)

software may be required to integrate a software package solution to an application with existing systems support.

- Imperfect Fit — Not all design requirements may be accommodated by packages. With enough time and money, developed software will support all application requirements.
- Nonstandard Processing Methods — Many general-purpose application packages will have to be tailored with custom software to support processing methods not commonly used (e.g., nonstandard edits or cost allocation procedures).
- Idle Programmer Resources — When confronted with a make/buy (developed vs. packaged software) decision and a programming staff that would remain underemployed if a package were purchased, the costs of the package alternatives should reflect this opportunity cost.
- Table Conversion — Since application software packages are designed with coding structures which work with user defined coding values (e.g., the users' chart of accounts), these code values are not delivered with the software. Rather, these code values must be converted to software package files called "Table Files." Accomplishing the installation of user code values on these files can be an extensive and time-consuming effort.

There are advantages:

- Low Implementation Risk — Most packages on the market have already been proven to work and come with vendor performance warranties and user education programs.
- Speedy Implementation — Use of a predeveloped software package eliminates development and some system testing effort.
- More Problem Definition and Analysis Time — Time that would otherwise be used to develop and test software can be spent profitably in systems analysis. This allows capable analysts to evaluate with users the "what" question more thoroughly, rather than the "how" question.
- Current Applications — Most software vendors make enhancements to packaged software available free of charge to existing users. These enhancements may be prompted by improvements in application techniques or by a user consensus on improvements. Additionally, many vendors will support ongoing maintenance to the software during installation.
- Participation in User Communities — Most package vendors sponsor user group meetings where users have an opportunity to share application problems and solutions.
- Use of Generally Accepted Procedures — Most software packages for standard financial applications incorporate generally accepted solutions to applications processing.
- Flexible Solution — Most software packages are developed as generalized solutions to an applications problem to give them the widest possible market appeal. The architecture of the design consequently provides wide flexibility for evolving an application after its implementation.
- Competitively Priced Alternatives — A variety of software packages is available for most applications, in a variety of prices.
- Reliable Documentation — On the whole, software documentation for packaged software is better than documentation generated for developed software. This is a consequence of timely documentation updates distributed by software vendors when enhancements are made. Documentation usually includes management summary, application user and system user documentation.

Software packages represent a practical alternative to developed software for business applications. They can usually be implemented with a greater likelihood of success and usually at a lower cost than an in-house developed business system. Most standard business application problems can be solved with packaged software.

Trade-offs in the design of the application should be considered when choosing between a development effort and a software package. When using packaged software, these trade-offs are often offset by the cost, speed and success of package installation.

Low cost and relevant operational and management information, available soon after a need is perceived, is the proper goal of business systems implementation efforts.

*Brenne is an analyst with the Washington, D.C. office of Booz, Allen & Hamilton, Inc., management consultants.*

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# Supply Firm Uses Service To Clean Up Recordkeeping

(Continued from Page S/11)

and we were anxious to get going."

In June 1970, NSS' first applications — general ledger and accounts payable — were up and running.

Other applications, such as accounts receivable and order entry, were brought into the system in the next several months. The most difficult application program turned out to be inventory, which was no surprise to Lane.

"There are more than 40,000 inventory items — about 4,000 at each location — to deal with," he said. "To work that kind of volumes into an interactive system is no small task. When we finally went on-line with inventory and it really worked, I was impressed."

Now, after seven years experience, what impressed Lane most about the system?

"I guess you'd have to say it's the XCS personnel. First of all, they know their business. Technically they're great. And they do their homework so they know exactly what it is we need in our business," he said. "When we need something new, they're usually able to work it out. And when they can't, they always tell us so and explain why. I like that kind of frankness."

The major justification for the system, however, is the competitive edge it gives NSS, according to Lane.

"It's costly to be out of stock in the janitorial supply business," he said. "There are dozens of competing companies, many of them smaller organizations that are just looking for an opening. So if you fail to deliver because you're temporarily out of stock, you're likely not only to lose that sale, but to lose that customer — permanently."

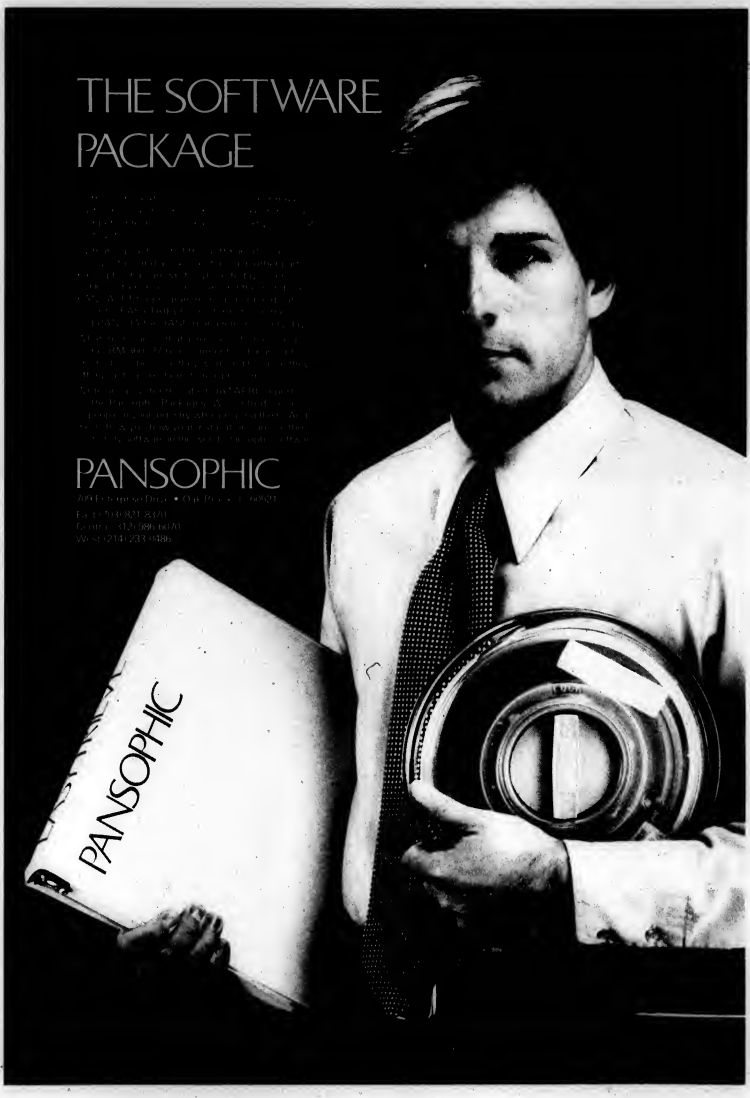
# Maintenance Major Factor

(Continued from Page S/15)

parison of development and installation activities when studying software acquisition vs. in-house development.

The costs and burdens of keeping the system alive and responsive during the entire useful life have taken their proper place of significance in the evaluation process. It appears that the true cost of software maintenance has finally been recognized and those that have been there find packaged solutions a superior alternative.

*Cross is president of B. Cross Associates, Indianapolis, Ind., and is actively engaged in seminars, client consulting and market research associated with the software industry.*



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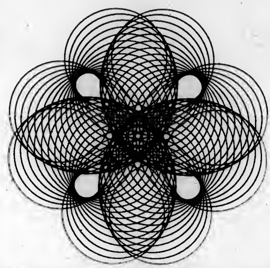

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# Mini Bits

## NCR Increases Memory On 7200 Desktop System

DAYTON, Ohio — NCR Corp. increased the memory size of its 7200 Model VI desktop system from 24K to 44K bytes as it unveiled a series of enhancements to the small system.

In addition, the firm announced users can now rent the system.

Designed for use as a "sophisticated data-entry device or as a back-office processor," the system has been enhanced to include a 128-char. Ascii set, increased from 96 characters, and to offer a 30 char./sec thermal printer and a 173 char./sec matrix printer, a spokesman said.

Previously, no printers were available for the system, he noted.

A system including a 24K processor, magnetic tape cassette, thermal printer and Basic software rents for $327/mo or costs $9,565 from the company headquartered in Dayton, Ohio 45479.

### Speaker to Cover Mini Pitfalls

CHICAGO — Some pitfalls of minicomputers will be discussed by a consultant speaking before the Windy City Chapter of the Association for Systems Management on Feb. 14 at 5:30 p.m.

Richard Friedman, president of General Business Consultants, Inc. will present a structured method for taking the non-monetary aspects of selection into account when choosing a system, he said.

The meeting will be held at the M&M Club in the Merchandise Mart and admission will be $10.

Information is available from Ron Goodman, CNA Insurance, CNA Plaza, Chicago, Ill. 60685.

### College Offering Certificates

IOWA FALLS, Iowa — Ellsworth Community College here is offering a one-semester certificate in minicomputer operations and a one-year certificate in minicomputer and electronic accounting.

Courses offered to fulfill the one-year program include minicomputer programming, file and data base management and data processing systems.

Information is available from Ellsworth Community College, 110 College Ave., Iowa Falls, Iowa 50126.

### *Users Rank Minis*

## Basic/Four Tops in Survey

DELRAN, N.J. — Datapro Research Corp. has released its user ratings of small business systems and minicomputers, and this year the survey results indicate that users of all models of Basic/Four Corp. systems are most satisfied.

The 15 respondees who had 17 Basic/Four systems gave the systems an overall satisfaction rating of 3.3 on a four-point scale ranging from "4" for excellent to "1" to poor.

Other individual systems seemed to fare as well if not better, however. Of those systems with more than 15 replies, Univac's 90/30, Hewlett-Packard Co.'s 3000 series of minis and IBM's System 3 received very high ratings. The 22 users of 25 HP 3000 series minis gave their systems an overall rating of 3.5 and IBM's System 3 models received a 3.3 rating from 119 users representing 125 machines.

Univac's 90/30 small business system was also given a 3.3 rating by the 15 users of 16 systems who responded to the Datapro survey.

The survey drew replies from 816 users of 2,362 installed minicomputers who were asked to rate 12 aspects of equipment software and vendor support, Datapro said.

Although Basic/Four came out on top in the overall satisfaction category, it was followed closely by several mini makers with replies from six or more users, the research organization said. HP, Microdata Corp., Univac and Wang Laboratories, Inc. received overall ratings of 3.2; Datapoint, Digital Equipment Corp., Four-Phase Systems, Inc. and Interdata, Inc. were rated at 3.1; and Burroughs Corp., IBM and NCR Corp. had ratings of 3.0.

### Unhappy Users

Users were not particularly happy with several other vendors' systems. Of those receiving six or more replies, Honeywell Information Systems, Inc. received a 2.9 rating, Data General Corp. a 2.8, Harris Corp. a 2.8, International Computers Ltd. a 2.6 and General Automation, Inc. a 2.3.

The venerable PDP-8 minicomputer from DEC took some knocks from 19 users with 48 minis at a 2.8 rating, and IBM's System 7 rated by 19 users with 23 systems received a grade of 2.7.

Users continued to rate the technical support and applications programs offered by their manufacturers as less than satisfactory.

Datapro pointed out that the use of minicomputers for data base management applications showed an increase since last year's survey. "The number of responding users who checked this application category jumped from 12% in 1976 to 16% for 1977. Data communications usage also increased from 22% in 1976 to 24% this year."

## Teachers' Credit Union Puts Small System on Payroll Job

**By Esther Surden**
CW Staff

BRISTOL, Conn. — When the old posting machine couldn't handle the workload at the Bristol Teachers Federal Credit Union here, the organization turned to a small business system and cut the time it took to perform its payroll deduction application from 2-1/2 days to 40 minutes.

"We had grown to a point where we needed an operator on the posting machine full time," manager Marty Bernard said. The union's management felt that using an operator in this way was "wasted manpower," he noted, so it "cast around for another system." Since the posting machine was a Burroughs Corp. L5000, Burroughs was a likely vendor to provide the union with its small business system.

The B80 installed at Bristol includes a CPU with 80K bytes of memory, a 180 char./sec console printer, a 250 line/min printer and 4.6M bytes of disk in two removable cartridges. Programs for the system were written by Burroughs people "from scratch" working with the credit union staff, Bernard explained.

The most important application the system performs is keeping track of payroll deductions, he continued. A teacher, for example, might sign up for $50 to be withheld from his pay every pay period, which in the case of Bristol teachers is every other week.

Since city hall handles the teachers' payroll, the city compiles a list of preap-

*(Continued on Page 53)*

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# Meet two new systems that double the power range of NCR's 8000 series.

## *The NCR V-8580 and V-8590.*

With these two new systems at the upper end of NCR's versatile 8000 series, every computer user now has access to twice as much NCR computer power. With an NCR system, he can upgrade smoothly through the entire power range without obsoleting his software design as his requirements grow. Because NCR's migration path extends from family to family, from generation to generation, from the entry level I-8100 all the way up to these powerful new computer systems.

The new systems bring latest state-of-the-art hardware and software technologies to bear on larger-volume processing problems. The user gets super-efficient performance at a price that fully reflects today's breakthroughs. In a smaller package. With a full complement of peripherals and terminals to meet his specific requirements.

Both systems offer VRX (Virtual Resource Executive), NCR's most sophisticated operating system software, to take full advantage of the hardware's architecture. VRX provides virtual memory operation, online program development, and the ability to function as multiple virtual machines.

Languages available with the two systems include COBOL 74, NEAT VS, FORTRAN, RPG and others.

### THE FIRST POWER STEP

The V-8580 is the power step preceding the V-8590, assuring smooth transition up to the highest power level. The V-8580 is ideally suited for large online and multiprogramming applications that take full advantage of the system's virtual memory.

It has distributed intelligence. The central processing unit is supported by up to seven additional processors which independently handle diagnostics, control, input/output and communications functions.

It uses multilevel pipeline processing. As each program instruction is executed, the next three instructions are simultaneously advanced toward execution to provide greater efficiency.

The V-8580 has a very high speed main processor with a cycle time of 56 nanoseconds. And its memory is substantial. Up to four megabytes in one-megabyte increments.

## DOUBLE THE POWER RANGE

The V-8590 is a twin-engine system with twice the power of any earlier NCR system. It has two main processors at the center of its distributed intelligence system operating on the same transfer bus. The processors share the same workload under the efficient control of VRX, aided also by the subordinate processors.

Both 56-nanosecond processors have equal access to memory and all other system resources. Both have multilevel pipeline processing capability. The shared memory ranges from two to six megabytes in one-megabyte increments.

The V-8590 functions in a multiprocessing mode, dynamically allocating system resources as needed. This shared-workload concept improves system thru-put and productivity.

Several of these new systems can be linked together as communicating processors in a network built around NCR's Distributed Network Architecture.

Also introduced to complement the V-8590 are two new high-performance peripherals, the 6370 tape unit and the 6540 data storage subsystem. The 6370 tape unit has dual mode capabilities—it can function in either the Phase Encoded (PE) mode at 1600 bpi or the Group Coded Recording (GCR) mode at 6250 bpi density. The 6540 has a capacity of 540 megabytes. The transfer rate of both disk and tape is an extremely fast 1.2 megabytes per second.

For a personal introduction to the V-8580 and V-8590, call your local NCR representative. Or write to EDP Systems, NCR Corporation, Box 606, Dayton, Ohio 45401.

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## *Talking to Mini Makers — Part 4*

# In Case of System Failure, Where to Turn?

**By Esther Surden**
CW Staff

You have a problem, but you don't know what's causing it. So you call your maintenance people. It takes them a couple of hours to arrive, but after working on it for a few hours they say "Sorry, it's a software problem."

So you call your software support representative and tell him what's going on. He comes down and tries to fix the problem, but you have already wasted many hours with the hardware person who came and went without fixing it.

That scenario is all too familiar to some users. So CW asked a random sampling of minicomputer and small system vendors who their users turn to when there is an undetermined hardware/software problem.

Most of the vendors contacted offered a single source for the user to contact.

At Digital Equipment Corp., user calls are "an extremely important part of our field activity, and we will try our best" to get back to the user as soon as possible. Secretaries in the offices are trained to ask questions that will lead to the right technical person to solve the problem, the spokesman said.

Microdata Corp.'s users first go to their dealer, but the firm says it can help a user determine a software bottleneck or problem because it can remotely access its users' systems. "We can walk a user through the system by dialing up the troubleshooter group here; we can look at the way they've put the code together," a spokesman said.

### Basic/Four Options

According to a spokesman for Basic/Four Corp., the user with an undefined problem has a series of options as to whom he should contact. If a problem is not clearly defined, the Basic/Four systems staff help the user isolate the problem into either hardware or software, but if the user at all suspects it is a hardware problem, he should call Sorbus directly. Sorbus maintains the Basic/Four equipment, the spokesman noted.

If a software vendor is involved, the user may have developed more confidence in that firm and may call it when a problem arises. To sum up, "there is no one way for the customer to proceed," he said.

Noting that "there are a whole range of crashes in which it is difficult to determine if a hardware or software problem is responsible," a spokesman for Tandem Computers, Inc. said, "we designed our system so that the surviving processor tells us what happened."

In the event of a hardware or software problem that is undefined, a Datapoint Corp. user can contact the firm's customer service organization, which then isolates the problem, a spokesman from Datapoint stated.

At Data General Corp., the field engineer is able to determine whether the crash is hardware or software related "through diagnostic tests," a spokesman for that company said.

Operating system failures and hardware failures are closely related and difficult to identify, a spokesman for Hewlett-Packard Co. noted. Customer engineers are called to make the determination, he added.

# System Handles Deductions For Teachers' Credit Union

*(Continued from Page 49)*

proved deductions and sends it to the credit union. Since the data base of those who normally take such deductions is already in the system's memory, "all we do is separate any exceptions" and enter them into the system, he said.

The B80 also takes care of distributing funds to various optional "clubs" such as vacation accounts or Christmas accounts or for loan payments.

The organization's management receives a number of reports to keep it up to date on the direction the credit union is taking, Bernard explained. Membership statistics, age statistics, dollar volumes by age groups and borrowing by age groups are some of the reports available on demand. In addition, "we have daily update capability and can have a trial balance any time we want," he noted.

Another program that will be running shortly on the system will print statements for members and do the organization's 1099 forms, he said. The system can produce labels for mailings of promotional materials or for use in mass advertising campaigns, such as for vacation "packages."

Teachers also have the option to sign up for insurance with a company in Bristol. The insurance company supplies the credit union with a quarterly listing of those who are taking advantage of the offer. The credit union can then access the teachers' accounts to pay the insurance, he explained.

As a manager, Bernard said he is satisfied with the system because the management reports the union gets are "excellent." But he does have some reservations. "It's not a simple system," he noted. "I have one person who is a super expert" on it now, but as yet "no backup." Bernard plans to train someone else in the operation.

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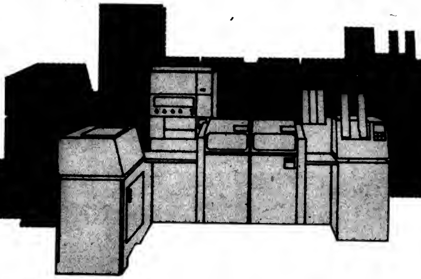

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## *Expedites Invoicing*

# Oil Firm Using Series/1 to Monitor Loading

SAVANNAH, Ga. – Colonial Oil Industries, Inc. here gets invoice data into its small business system overnight, instead of in two to three days, by using a minicomputer.

The firm is using an IBM Series/1 mini with a multiuser operating system to monitor industrial fuel oil loading. The system controls the loading of petroleum products at the distribution terminal.

Before getting the mini, the firm performed the petroleum product loading application manually, according to Robert Demere Jr., assistant vice-president.

When a bill of lading was issued, it had to be manually checked against the inventory, and the checker had to make sure all the bills of lading were in the correct numerical order. Another worker had to code the bill of lading and then the information had to be keypunched so that it could be finally processed by the firm's System/3, he explained. It took the company two or three days to get the information into the computer for invoicing, Demere stated.

With the Series/1, "the invoices can be processed the next day," saving the company a "considerable amount of money."

The mini, which operates 24-hours a day, seven days a week, first receives data about a truck when the gate guard inserts a magnetically encoded badge into a badge reader. After performing a credit check, the mini notifies the dispatchers of the arrival through a set of Hazeltine Corp. 1510 CRTs. A dispatcher then assigns the truck to a loading platform.

The system monitors the flow of oil into the truck and shuts off the pumps when any one of several boundary conditions is met.

When the gate guard again inserts the departing driver's badge into the badge reader, a bill of lading is printed in the guard house. At the end of each day, a billing information diskette is written for processing by Colonial's IBM 3.

Graham Computer Enterprises, Inc. of Birmingham, Ala. programmed the system for Colonial using the multiuser version of its Basic/1. Each major function in the system is treated as a different user. Information is passed from user to user through a resident common area or through shared disk files. Graham also added some assembly language routines to process the badge readers and oil pumps.

### Local Service Available

Colonial chose the Series/1 for the oil loading application for several reasons, according to Demere. "We have another automated system across the road," he related, and the firm has some trouble with this non-IBM system. Since it is a paper-tape-oriented system it is "very expensive" to change it. In addition, there was no local service for it.

IBM had a service representative in Savannah, he pointed out and that was important because when a system is installed for this type of application, a company begins to rely on it. When it's down, a firm could get hurt, he said. Also, "we can modify programs ourselves," he noted.

Colonial hopes to be able to market the system to other users in its industry and thinks the IBM name would be easy to sell. Furthermore, "they were cheap" in comparison with other systems the firm examined, he continued.

# Extender Board Fits DEC Units

LAGUNA HILLS, Calif.– A dual height extender board for use with most Digital Equipment Corp. backplanes is available from Southwest Systems here.

The extender board can be used with DEC PDP-11 and PDP-8 minis, LSI-11 and LSI-11/2 microcomputers, Heath's H-11 and the MDB Systems, Inc. MLSI-BPA84 backplane/cardguide, according to a spokesman for the firm.

The unit provides access to both sides of the board outside the card cage, making all test points available to aid diagnostics and trouble-shooting. Tagged at $60, it is available from Southwest, which can be reached through Box 2808, Laguna Hills, Calif. 92653.

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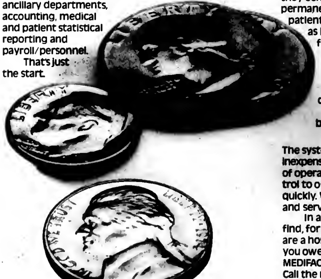

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# Club Swings Savings With Modular Machine

WICHITA, Kan. — The Wichita Country Club decided it needed a computer system to handle its sports, entertainment and business accounts, and that decision is saving the club money and manpower, according to Donna Fowler, office manager.

In order to evaluate the feasibility of automating, the club organized a selection committee, which in turn directed some certified public accountants to draft requests for proposals.

The requests were submitted to several vendors, including IBM, NCR and Wang Laboratories. The returned proposals were evaluated and several manufacturers were selected to give demonstrations and oral presentations, Fowler said.

Since the staff would be directly involved with the operation of the equipment, it also participated in the decision. It attended oral presentations and demonstrations given by the vendors and gave its opinions to the selection committee and the club's board of directors.

The final selection of equipment was predicated on the following criteria:

- Equipment had to provide a flexible growth potential,
- Computer language had to be commonly understood.
- The office staff should be able to operate the equipment without excessive training.
- Support for the equipment should be available locally.
- Cost factors had to be competitive.

The committee finally selected Wang Laboratories for the hardware because it seemed to offer the best price and the best service, Fowler said.

A local software group was retained to provide the necessary programming. Programming considerations favored the local effort because no "package" applications were presented which resolved the needs of club operations, she said.

### Difficult Application

One of the applications developed for the system was payroll, which needed the capability to handle high volume part-time help, seasonal fluctuations, salaried and hourly rates of pay, meals and other considerations such as employee benefit qualifications — all within a multiple-level accounting structure in which certain employees were allocated to more than one level.

Currently, payroll operations occupy about six hours, as opposed to three days previously, Fowler said. When the club staff expands to 120 employees in the busy summer season, 220 W-2 forms have to be prepared. This year-end work, which previously required approximately three-and-a-half man weeks, is now completed in one-and-a-half hours, she added.

Accounts receivable required the monthly computation of various classes of dues with the appropriate general ledger notation, member charges for all activities, including pro shop purchases, and rendering of statements and acceptance of payments.

In the area of accounts payable there were only minor deviations from "standard" to provide adequate general ledger accounting. Though by no means unique, the general ledger financial reporting system did need to prepare reports for and support each activity center.

Originally each item was handled a minimum of three times. First, it was classified and posted to expense; next the check was written (250 per month); and finally the check was properly posted to the ledgers.

With the Wang system the classifications and subsequent entry into the system is all that is required, Fowler noted. The computer prepares the checks, registers and appropriate expense account postings.

The club has a membership of 820, plus reciprocal memberships and a tennis and golf pro shop. Last year 23,500 rounds of golf were played with the usual amount of cart rentals and bag storage costs; a typical round of golf may result in four tickets of charges.

All the billings for the activities, services and merchandise are handled by the system, Fowler said.

### System Benefits

One of the benefits the system has generated is its ability to reduce or eliminate the continual balancing and rebalancing which accompanies nonautomated methods, Fowler said. Time savings have been in segments of several hours or days in the various areas of application, she claimed.

This has resulted in special reviews and analysis being available which were not previously possible, she added. For example, financial statements for all 12 activity centers are now normally available by the 10th working day; member statements were previously rarely available before the 10th of the month and, of course, financials could not be started before member statements were finalized, Fowler said.

Club members' acceptance of the system was an original concern and, as was expected, a certain amount of confusion resulted from the first statements. A format change in the statements was presented which resolved most of the confusion, according to Fowler.

"We bought equipment which represented mid-range hardware for the vendor. We could have started smaller, but now we have the time and capacity for growth by simply adding modularly to our existing equipment," Fowler said.

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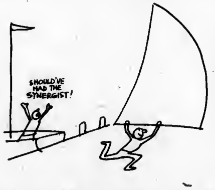
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# System Conveys Savings to Supplier of Belts

**By Jason R. Taylor**
Special to CW

ENGLEWOOD, N.J. — Using a minicomputer to keep track of a constantly moving inventory and a complex pricing scheme has brought savings to Siegling America here, a supplier of belting used in conveyer belts.

Seigling America is a subsidiary of Siegling, a worldwide organization with headquarters in Hanover, West Germany. It supplies belting to users in the U.S. via salesmen, sales representatives and about 70 distributors.

About 10 years ago, when the business began to expand rapidly, the firm investigated systems that could be used for order entry accounting as well as for various engineering calculations.

"We expected the system would be free about half the time for technical usage," Kenneth Tsunoda, president, recalled.

The company's needs were satisfied, but not in the proportion anticipated.

Accounting and general business applications now are run six hours a day, five days a week and engineering problems are taken care of after 5 p.m. and on Saturdays.

## Direct Approach

The hardware system used is a Digital Equipment Corp. PDP-8/E with a CRT terminal, high-speed line printer and disk storage. The software, developed by Symbolic Systems, Inc. of Summit, N.J., consists of a series of integrated programs performing invoicing, accounts receivable, accounts payable, general ledger, sales analyses, salesmen's commissions, belt usage and inventory.

"We talked to DEC and it recommended Symbolic Systems as a software consultant," Tsunoda said. "The software vendor supplied us with a list of names of recent clients it served; we talked to them and received very favorable reports.

"The other factor that impressed us was the vendor's direct approach. Many other vendors had tried to sell us 'a lot for a little investment' and you'd have to be quite naive to believe a sales pitch like that," he added.

'While Siegling America's accounts payable and accounts receivable functions are pretty standard, we inventory several different size rolls and over 100 different belt styles; some belts may be irregularly shaped or have pieces removed," Nathan Rosen, technical liaison, pointed out. "This necessitates a very complex, nonstandard inventory control system."

Somewhat fewer than 1,000 orders are processed each month. When an order is received by telephone or mail, the customer's name (for new customers) or number, belt dimensions, type of belt and quantity are entered into the system.

As order entry is made, status report information is stored and can be recalled at any time. An order status report can be printed on a daily basis, listing date shipped or expected shipping date.

Orders are printed and sent to the shop for processing. Following shipment, the order is returned to the office and invoiced. Invoices, complete with the lastest pricing on each belt type, then printed and mailed to each customer. As this is done, the system removes the belt from "stock" status to "usage" status.

"We can tell a great deal from what we ship," Rosen claimed. "For example, if we're importing large shipments of 10-inch-wide belting from Germany but shipping large quantities of eight-inch wide belting, the printout tells us to alter our orders. In this way we save the man-hours and dollars associated with cutting and slitting of 10-inch rolls."

Siegling's system generates several belt usage reports which post current information on what is being sold, where and by whom. Usage reports contain exactly what each of Siegling's distributors use during recent quarters or year-to-date periods. Included are customer, belt usage by type width, and category with a four-quarter moving average.

The reports enable Siegling to observe trends and analyze its distributors' orders.

Each month the system calculates commissions and produces printouts of sales volume and commissions for every sales representative and distributor, including a tabulation of credits and returns. This information is later used in corporate overview reports.

## Engineering Problems

Engineering problems which are cumbersome to tackle on a desk calculator are run on the PDP-8/E. The system can be used to answer problemmatical questions, such as what will happen to a belt of given stiffness running with a certain speed over a pulley of specified diameter. If the belt flexes and if the pulley is too small or the speed too fast, the belt will fail.

Experimentally gathered data under a series of such conditions is fit to a curve by the technique of linear regression so failure predictions can be made for a variety of conditions.

## Losses Cut

Siegling uses a very complicated pricing system; prior to acquisition of its hardware/software system, pricing was calculated and checked on a desk calculator. Customers regularly complained of overcharges and undercharges.

The undercharging complaints originated most often from large companies that used computer systems of their own, which automatically flagged any discrepancy.

"We found overcharge complaints outnumbered undercharge complaints by about 10 to 1," Tsunoda recounted. "Our inevitable conclusion was that the majority of undercharged customers never complained."

The estimated losses from this single source over only one year were nearly equivalent to the total dollars invested in the entire computerized system, Tsunoda said. "Our system has essentially cost-justified itself in only one year based solely on eliminating these pricing errors," he added.

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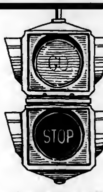

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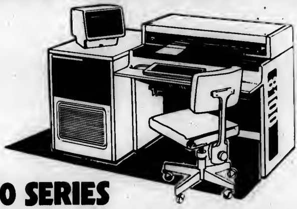

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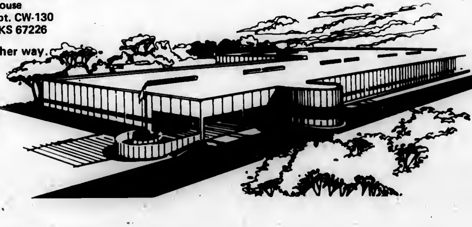

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# Canadian Hotel Gains Control of Back Office

By Esther Surden
CW Staff

MONTREAL — A small business system lodged at the Queen Elizabeth Hotel here has provided this 1,200-room hostelry with control over back-office functions, according to Robert Bennet, director of data services.

Managed by Hilton International, the hotel had been running its payroll on a service bureau machine and its general ledger and accounts payable on a posting machine before sending out a request for proposals for a small business system in December 1976.

The hotel took bids from several vendors including Basic/Four Corp., Four-Phase Systems, Inc., NCR Corp. and IBM, but settled on a Micos system from Mini-Computer Systems, Inc.

The Micos system was sold through Acom Computer Systems of Montreal, a turnkey vendor with experience in the hospitality industry; the hotel "felt the Micos operating system as well as the program development aids meant Acom could do the job quickly," Bennett said.

"We knew we would have to make a lot of changes," he added.

The installed system includes a CPU with a 64K memory — soon to be expanded to 96K, two 40M-byte disk drives, four CRTs and a 300 line/min printer.

The system was originally purchased to automate the general ledger, payroll and accounts payable functions, but the hotel is now adding an inventory package to the system and will continue to add functions, he indicated.

The applications development is being handled by the turnkey vendor, which "will do all the programming on an ongoing basis," he said.

In the future, Hilton expects to expand the use of the small business system to other hotels it manages. Since all of the applications development will have been done at the first site, the cost of installing the other systems will be minimal, Bennett said.

"Disk drives on the systems will be compatible so we can share software development," he pointed out.

The hotel employs about 1,400 people at any one time, 1,200 of them permanent employees and another 200 as required. Over the course of a year, about 4,000 people are employed to provide manual, administrative and executive services.

The system runs 12 payrolls a month, with a total of about 5,000 checks. This process was adequately served by the service bureau, but the bureau produced none of the analytical documents required by the home office.

With the small business system, the hotel gets about 40 custom-designed reports printed out.

## Reader/Punch Offers Parallel Or Serial Links

NORTHBROOK, Ill. — Data Specialties, Inc. has introduced a paper tape reader/-punch combination unit that has either a parallel or serial RS-232 interface.

Operating at speeds up to 75 char./sec for the punch and reading at up to 300 char./sec, the SRP-3075 features a punch mechanism the vendor said is guaranteed to perforate a minimum of 1 million feet of paper tape.

The unit can punch mylar, mylar laminates, oiled, unoiled, rolled and folded tapes without modification, the vendor stated. It costs $2,335 from the company at 3455 Commercial Ave., Northbrook, Ill. 60062.

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### *Attendees Largely Novices*

# D.C. Expo Features Lesser Known Gear

**By Edith Holmes**
CW Staff

WASHINGTON, D.C. — Snow and ice kept down crowds on the first day of the Personal & Small Business Computer Expo here recently, but clearer roads on the second day brought out the uninitiated into the world of small-scale computing — in force.

What these newcomers found at the Washington Hilton ranged from a Creative Computing game called "Computer Rage," T-shirts featuring the "Bionic Toad" and books urging them to *Take a Chance With Your Calculator* to all manner of micro-based CPU and CRT kits, turnkey microcomputer systems and Univac's BC/7 small business system.

Univac and Basic/Four Corp. looked somewhat out of place at a show dominated by distributors of personal computing gear and attendees who were mostly novices.

What visitors to this show didn't see were the major manufacturers in the microcomputing field, according to Harold Weinberg of Marketline Systems. Seals Electronics, Inc. exhibited its Peripheral Universal Processor (PUP-1) microcomputer, but Altair, Cromenco, Southwest Technical Products and Imsai were absent, he noted.

The chief kit makers won't be seen at shows in the eastern U.S., Weinberg predicted, until the Atlantic City Personal Computing Exposition, scheduled for the end of August.

#### Hobby Market 'Limited'

The component makers and kit distributors who lined the boothes of this show aimed their wares more at the small businessman than the hobbyist, in Weinberg's view. "They want to attract the $1 million sales company and the sophisticated retailer because the hobby market is somewhat limited," he said.

One of the show's 38 exhibitors, Jade Computer Products, which generally sells to hobbyists with its X-80 CPU kit, 8K static random-access memory and CRT interface kits, had a $2,650 Info 2000 disk system on display for the first time.

"The market is moving toward small businesses and complete systems," Jade's Gregg Puckett said. "Most hobbyists couldn't afford the Info 2000 memory."

While it's "hard to keep up with the knowledge required to sell and service complete devices or systems, there's more money in these higher ticket items," Puckett stated.

Despite this trend by distributors, Puckett believes hobbyists "definitely aren't dying out." Building a micro-based computer system is "still the cheapest way to get a thinking machine bigger than a calculator," he said.

While the hobbyist might continue to frequent computer shops even though those shops are shifting their attention to the small businessman, the owner of a store called Intelligent Business Machines believes businessmen will turn directly to manufacturers of microcomputer systems if the shops can't repair what they sell.

"The computer shop per se is dead as an outlet for small businesses in search of a computer system," according to Dr. Jerald Jay Zeger. The small businessman doesn't want a $10,000 system to do the payroll for 20 employees; he wants a system, tailored to his business through customized software, that will help him decide what product lines to add and which ones to cancel, he added.

The computer store that wants to survive must be willing to repair that system when something goes wrong as well as to fine-tune it to the business' needs, Zeger stated.

Meanwhile, computer novices rather than interested businessmen or dedicated hobbyists filled the aisles of the show, produced by Felsburg Associates, Inc. of Bowie, Md.

Among the most popular attractions for these attendees were a computer store's replica of the robot R2-D2 from "Star Wars" and games such as Lunar Landing, Football and Star Trek, available on an IBM 5100 minicomputer. The desktop unit was displayed by an IBM-sponsored Boy Scout Explorer post.

The robot, named RX-1 by its creator, Computers Plus, rolled up and down one aisle, blinking its lights and talking electronic gibberish to passers-by. Adults and children alike were entranced by RX-1 — all except for three-year-old Marsha, who demanded to know where the machine's hands were.

CW Photos by E. Holmes

A "snow day" left school-age hobbyists free for a trip to the show, where a replica of the robot R2-D2 and retailers' displays captured their interest.

# Percom Floppy Disk System Offers Compatibility With 6800

GARLAND, Texas — A minifloppy disk system that utilizes the Shugart SA-400 drive, has a capacity for 3K bytes of programmable read-only memory (Prom) and is compatible with the SS-50 bus of Southwest Technical Products Corp.'s 6800 micro has been introduced by Percom Data Co., Inc.

The LFD-400 comes in one- or two-drive configurations and includes a controller printed circuit board, disk operating system, disk drives, two minidiskettes, a power supply and interconnecting cable, a spokesman said.

The controller board includes voltage-drop regulators, a proprietary "bit shifting" compensation circuit and an inactivity time-out circuit, he added.

Disk speed of the unit is 300 rev/min with a data transfer rate of 125 kbit/sec. The read/write head is stepped from track to track at 40 msec/step and the drive system features a media interlock device, Percom said.

The LFD-400 storage media is a 10-sectored minifloppy diskette that accommodates 89.6K bytes of data on 35 tracks. Recording is performed in a Bi-phase-M or double frequency mode, the firm said.

The program for the disk operating system includes load-and-save routines and is contained in an erasable Prom bootstrap, the spokesman added.

The price of the system, in single- and double-disk configurations, is $549.50 and $924.50, respectively. Percom is located at 318 Barnes, Garland, Texas 75042.

# Super Basic Update Allows Serial I/O

PRINCETON, N.J. — Technical Design Labs (TDL) has upgraded its Version 2.1 of Super Basic with the introduction of Version 3.0, a 12K Basic interpreter.

Version 3.0 provides programmable error handling that allows the user to specify error routines without aborting a program, according to a spokesman.

It also allows serial data I/O from controlled and noncontrolled read/punch devices and provides an end-of-file detection routine, he stated, noting variable addressing and load/save specifications have been included.

The software package occupies 12K of core memory, is relocatable and was designed to run on Z-80 based systems, the firm said. It comes on a diskette (Software Package A) consisting of Version 3.0, Macro Assembler 2.2, Z-Tel text-editing language and the Text Output Processor.

The package costs $249 from Technical Design Labs, Building H, Research Park, 1101 State Road, Princeton, N.J. 08540.

**G**

**GARBAGE** — A slang computer term for unwanted and meaningless information carried in memory or storage. Also referred to as hash.

**GENERAL-PURPOSE COMPUTER** — A computer designed to solve a large variety of problems, e.g., a stored program computer which may be adapted to any of a very large class of applications.

**GIGA** — A prefix signifying one billion, or $10^9$.

**H**

**HALF-DUPLEX OPERATION** — A duplex communication system which can operate in either direction, but not in both simultaneously.

**HALT** — A condition which occurs when the sequence of operations in a program stops. This can be done to a halt operation being met or due to some unexpected halt or interrupt. The program can normally continue after a halt unless it is a drop dead halt.

**HARD COPY** — Typewritten or printed characters on paper produced by a computer at the same time the information is copied or converted into machine language that is not easily read by a human.

**HARDWARE** — Refers to the metallic or "hard components of a computer system in contrast to the "soft" or programming components. The components of circuits may be active, passive or both.

[illegible] — Often consists of programmable read-only memories (Prom) that plug into simulation boards, enabling the prototype to assemble its own programs.

**HARDWARE INTERRUPT FACILITY** — A hardware interrupt facility permits input/output operations to be scheduled under interrupt control. The interrupt facility may be selectively enabled or disabled under program control. When the interrupt facility is enabled, a device generates a processor interrupt each time it is ready to receive or transmit data. Use of the interrupt facility enables input/output operations to be performed simultaneously with computing.

**HARD-WIRE LOGIC** — Refers to logic designs for control or problem solutions that require interconnection of numerous integrated circuits formed or wired for specific purposes and relatively unalterable. A hand-wired diode matrix is hard-wired logic whereas a random-access memory (RAM), read-only memory (ROM) or CPU can be reprogrammed with little difficulty to change the purpose of operations.

**HEADER** — The initial portion of a message containing any information, control codes and so on that are not part of the text (e.g., routing, destination, addresses and time of origination.

## LEARNERS LEXICON

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## *Apple II, Printer Linked*

HERMOSA BEACH, Calif. — Microproducts has announced an interface for use between Apple Computers' Apple II microcomputer and Southwest Technical Products Corp. PR-40 printer.

The interface board plugs directly into Slot 3 of the Apple II. The printer, when connected, will print one line at a time, list the entire program without stopping as the screen scrolls up one line at a time or print the entire contents of the CRT screen, a spokesman explained.

The operating software, included on a cassette, permits printer operation in either Basic or Assembly language, he added.

The board, interconnecting cable and programmed audio cassette costs $49.95 from Microproducts, 1024 17th St., Hermosa Beach, Calif. 90265.

# Lear Adds Peripheral Duo

ANAHEIM, Calif. — Lear Siegler, Inc. has introduced a CRT/printer package that includes the company's ADM-3A dumb terminal, Model 210 Ballistic printer and interconnecting cable.

The Dumb Connection Peripheral Package features 59 data entry keys, a 24-line, 12 in. screen and 1,920 characters, a spokesman said. It has 33 switches allowing the user to operate at 11 different transmission rates from 75 bit/sec to 19.2 kbit/sec, he added.

Lear Siegler Peripheral Package

### Bidirectional Printing

The printer portion operates bidirectionally at rates of 75 line/min for 132 characters; 120 line/min for 80 characters; and more than 900 line/min for one character line, the firm stated.

Other printer options include fully buffered input, upper and lower case plus underlining, a ribbon reinking system and single and multipart form printing, the firm said.

The package costs $3,890 from the firm at 714 N. Brookhurst St., Anaheim, Calif. 92803.

### *For North Star*

# Disk System Gets Software

SPRINGFIELD, Ill. — The Diskette Utility Package (DUP), compatible with the North Star disk operating system with 6K to 16K of memory, is available from Business Computer Systems.

The DUP contains four statements — COMPRESS, which reduces Basic programs by removing unnecessary spaces; DISKCOPY, which allows copying of diskettes on a single drive system; FREEBLKS, which minimizes the number of blocks allocated to Basic programs to the actual number needed; and SORTDIRA, which sorts the directory by alphabetic file name and stores it on the back of the diskette, a spokesman said.

### I/O Via Calls

All I/O is performed through calls to the disk operating system; the programs are in object form on the diskette, assembled to user specifications at the time of order, the firm added.

Price of the package on diskette and with documentation is $25 from Business Computer Systems, 216 Collier Drive, Springfield, Ill. 62704.

# Program Matrix Features Diodes

MAMARONECK, N.Y. — A program matrix board that incorporates diode pins for the sequential selection of functions has been announced by Sealectro Corp.

The Mini Promm matrix can be mounted on a printed circuit board on .100 centers. Changes in programs can be accomplished by moving the various programming pins, a spokesman said.

The unit is available in kit form. It costs $37.50 from Sealectro's Programming Devices Division in Mamaroneck, N.Y. 10543.

# Nortronics Offering Bulk Cassette Eraser

MINNEAPOLIS — A cassette bulk eraser that is said to require no alternating current or battery power source for operation has been introduced by Nortronics Co., Inc.

Erasure is accomplished by passing the cassette through a magnetic field created by built-in ceramic magnets, a spokesman explained.

The QM-230 is a hand-held unit and has applications in word processing, dictation security and other office operations, the firm stated.

Price of the eraser is $24 from the firm at 8101 Tenth Ave. North, Minneapolis, Minn. 55427.

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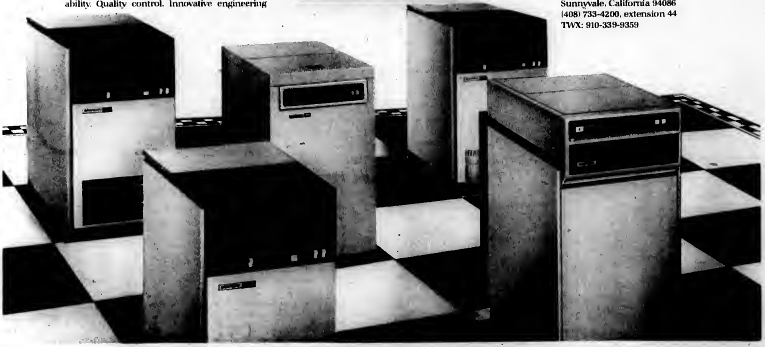

## Consultant Predicts
# Floppy Drive Sales to Grow 41%/Year

**By Jeffry Beeler**
CW Staff

MOUNTAIN VIEW, Calif. — Worldwide sales of floppy disk drives totaled $277.8 million last year and will grow an average of 41.8% annually to surpass $635.3 million by 1980, according to a market study released here recently by independent consultant James N. Porter.

In his 81-page study, Porter said U.S. manufacturers in 1977 accounted for 80% of the worldwide revenues from floppy disk drives, but he predicted that share would dip slightly to 76% during the next three years.

Last year, American sales of flexible disk drives totaled $222 million, with the captive market accounting for $140 million of that figure and the balance going to the noncaptive market. By 1980, U.S. revenues from the peripherals will near $486 million, with the captive and noncaptive markets totaling $343.8 million and $142.1 million respectively, the report estimated.

Among non-U.S. companies, total floppy disk drive shipments approached $56 million in 1977. Three years from now, foreign revenues in the industry will exceed $149 million — $107 million for the captive market and the remaining $41.8 million for the noncaptive market, the study predicted.

Of the 19 firms currently constituting the domestic floppy disk drive industry, IBM accounted for the largest market share, with 1977 revenues totaling $96.8 million, or 35% of all sales. By 1980, the company's hold on the floppy disk drive market will weaken to 32%, though its sales will rise to more than $205 million, the report forecast.

In the captive sector, IBM proved even more dominant than in the floppy disk drive market as a whole. During 1976, the firm claimed 88% of domestic sales, with most of the remaining portions of the total $88.8 million market divided among Sycor, Inc., Control Data Corp. and Datapoint Corp., Porter noted.

In the OEM market, however, a very different sales picture emerged. There, Shugart Associates ruled the roost in 1976 with a "commanding" 34.4% share of the total $41.9 million market. Leading challengers to Shugart's dominance included California Computer Products, Inc. with an 18.1% market share and CDC with 14.3%, the study added.

Last year, Shugart maintained its lead in the OEM sector, while CDC took over second place from Calcomp, which Porter says suffered from Digital Equipment Corp.'s internal manufacturing program.

As a whole, the OEM sector accounted for about 70% of the 384,000 units sold worldwide last year, although it represented only 34% of total revenues. By 1980, OEM sales will constitute 65.5% of worldwide floppy disk drive shipments and 29% of total revenues, the report estimated.

Despite a dwindling share of the world market, OEM sales of floppy disk drives will contiue to expand, both in revenues and volume of units shipped, Porter added. Last year, sales totaled $93. million, of which the U.S. contributed $82 million, and unit volume fell just short of 270,000.

In 1980, worldwide OEM revenues from the products will rise to $183.9 million, including domestic sales of $142.1 million, and shipments will more than triple to 886,000 units, the study predicted.

Analyzing floppy disk drive market trends by product class, the report noted that 8-in. one-sided units accounted for 99.7% of global sales in 1976 when revenues and shipment totaled $165.6 million and 198,000, respectively. In 1977, the product category's share of total revenues fell to 85.5% and its share of total shipments slipped to 83.7%, even though sales rose to $237.4 million and unit volume jumped to 322,200.

By 1980, revenues from 8-in., one-sided units will constitute 29.1% of all floppy disk drive shipments for a total volume of 258,000 products. At the same time, revenues will top $198 million for a 31.2% share of total floppy disk drive sales, Porter found.

In the 8-in., two-sided drive sector, shipments in 1977 totaled 5,700 units or 5.7% of total floppy disk drive volume. Revenues, meanwhile, exceeded $31 million, which represented 11.2% of total 1977 sales in the floppy disk drive market.

Three years from now, shipments of the 8-in., two-sided products will account for 46.2% of worldwide floppy disk drive volume and 59.4% of total revenues.

### Smaller Drives

In the 5.25-in. drive sector, shipments numbered 40,600 units and sales totaled $9.3 million — figures that, respectively, represented a 10.6% and 3.3% share of the worldwide floppy disk drive market, the study noted. By 1980, the 5.25-in. drive's share of the total floppy disk drive shipments will rise to 24.7% and its share of total revenues will nearly triple to 9.4%.

Revenues from the 5.25-in. units will near $60 million in three years, and shipments will total 219,000 units, the report added.

As expected, Porter found that U.S. manufacturers dominated sales of all three floppy disk drive categories. Last year, domestic revenues from 8-in., one-sided drives accounted for 76% of the worldwide market. During the next three years, that market share is not expected to change much, even though U.S. shipments will shrink from 182,100 to 152,400 units.

# IBM Reportedly Slating 3032s For People's Bank of China

HONG KONG — IBM is planning to ship at least two 3032 systems to the Hong Kong branch of the People's Bank of China, according to *EDP Japan Report*, a newsletter by International Data Corp. Japan.

But an IBM spokesman would neither confirm nor deny that report. He did say "I can confirm that we have been having business discussions with the Bank of China in Hong Kong over a period of time, but we prefer not to disclose details since we consider the discussions confidential."

Recently, Chairman Frank T. Cary and a number of other IBMers visited China after attending a board meeting in Tokyo. Prior to departing for China, Cary stated: "We simply want to learn more about the People's Republic of China's cultural and industrial development, its data processing requirements and the opportunity for trade there," according to the report in *EDP Japan Report*.

Apparently the 3032s will be used for online processing of foreign exchange transactions by the bank. The bank is planning on a system whose total value is about $20 million: $10 million for dual CPUs and $10 million for terminals, *EDP Japan Report* indicated.

Banking terminals from Nixdorf Computer will be installed at 800 sites — either branches or other banks affiliated with the People's Bank.

Six persons from China, including those involved with the on-line banking program at the People's Bank, visited the Yasu plant of IBM Japan where the 3032 is currently being produced. The group also visited major commercial banks that have developed advanced, on-line banking systems, the report continued.

The group was interested in problems associated with operating a network in which the CPU and terminals are from different manufacturers; the amount of system software and its memory requirements; maintenance operations and ways of coping with system failure, the report said.

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## *Buoyed by Outright Sales*

# IBM Earnings Set Record for Year, Quarter

ARMONK, N.Y. — Buoyed by a high rate of outright sales of DP equipment, IBM's earnings set records in both the quarter and year, rising 18.3% for the quarter and 13.4% for the year ended Dec. 31.

Revenues, including adjustments for foreign currency, rose 11.5% in the quarter and 11.2% for the year.

High worldwide levels of outright purchases of DP equipment resulted in a "record level for the year, with the fourth quarter higher than any previous quarter," Chairman Frank T. Cary said.

"Outright purchases of DP equipment are expected to continue at high levels. However, it is unlikely that the strong rate of increase experienced in 1977 will continue in 1978. If it does not, period-to-period earnings comparisons will not be as favorable as they were in 1977," he stated.

For the year, earnings totaled $2.719 billion or $18.30 a share compared with year-ago figures of $2.398 billion or $15.94 a share.

Contributing to the year's earnings was a $28 million gain in foreign currency exchange. Other income totaled $475.2 million, down 3.9% from $494.469 million last year.

Revenues for 1977 totaled $18.133 billion, up 11.2% compared with $16.304 billion in the previous year. Outright sales rose 19% to $7.09 billion from $5.959 billion last year, while rental and services revenues rose only 6.7% to $11.043 billion from $10.345 billion last year.

"The relatively low increase in 1977 continues to reflect the heavy purchase activity which took place during the past two years," Cary added.

"Incoming orders were substantially ahead of 1976. This contributed to a year-end backlog well in excess of last year, even though 1977 shipments exceeded the high levels achieved during the previous year," he continued.

During the quarter, earnings rose 18.3% to $797.4 million or $5.38 a share compared with nearly $674 million or $4.47 a share in the same period last year.

IBM posted a gain from foreign currency exchange of $64 million in the fourth quarter.

Other income declined 10.3% to $123.4 million compared with $137.6 million in the same period last year. An IBM spokesman attributed the decline, both for the year and the quarter, to the firm's use of cash and marketable securities in purchasing its own shares.

Fourth-quarter revenues totaled $5.038 billion, up 11.5% from $4.518 billion in the same period last year. The increases in sales and rentals and services were similar to those for the year.

Sales rose 19.1% to $2.197 billion from $1.845 billion. Rentals and services rose 6.3% to $2.841 billion from $2.674 billion in the year-ago period.

For the year, operations outside the U.S. contributed revenues of $9.125 million compared with $8.154 million in 1976 while earnings were $1.228 million compared with $1.057 million in 1976, which was restated on a comparable basis, Cary said.

## Financial News

# Telenet Offer Yields $8.3 Million

WASHINGTON, D.C. — Although many firms avoid going to the public for funds, Telenet Corp.'s offer of 951,087 shares of common stock yielded the firm $8.3 million in equity financing.

The offering, at $9 a share, was oversubscribed. Of the total, 625,000 shares were sold to the public and 951,087 were sold direct to the firm's six largest stockholders for $2.7 million. More than half the $2.7 million amount is to be paid by the surrender of promissory notes of Telenet by the stockholders.

### Plans for Expansion

Proceeds will be used primarily for expansion of the firm's data communications network and marketing, the support of higher speed terminals and the introduction of new message services.

Bolt Beranek and Newman, Inc., which formed Telenet in 1972, purchased 133,313 Telenet shares for about $1.1 million and said it will, as a result, own an approximate 29% interest in Telenet, which operates a packet-switched data network.

## Nickels & Dimes

**Applied Data Research (ADR)** expects 1977 results will set records with total revenues of about $20 million, President John R. Bennett indicated. The firm's recent sale of its Communications Systems Division to Communications Group, Inc. allows ADR to devote full attention to expansion of its software operations, he added.

$ $ $

Dividend time: **Anacomp,** Indianapolis-based service and facility management firm, declared a quarterly cash dividend of 5 cents a share on common stock payable Feb. 10 to holders of record Jan. 18.

**National CSS** will pay 6 cents a share March 7 to holders of record Feb. 15, the firm's seventh consecutive quarterly dividend.

$ $ $

**Quantor** has doubled its line of credit since January 1976 to $17 million through Crocker National Bank.

$ $ $

**Functional Automation,** Nashua, N.H., has received investment from the Palmer Organization. Functional Automation plans to introduce a 64-bit system directed at specialized preprocessing applications.

$ $ $

**Data Terminal Systems** shareholders have some goodies coming to them. First is a 3:1 stock split in the form of a dividend payable Jan. 31 to holders of record Jan. 20. The total number of authorized shares has been raised to 15 million from 2.25 million.

In addition, the firm announced its first cash dividend, a year-end distribution of 30 cents a share before the split or 10 cents a share post split.

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## Financial News

# NCR Chalks Up 50% Rise in Earnings for 1977

DAYTON, Ohio — NCR Corp. wound up 1977 with a whopping 50% rise in earnings on a 9% increase in revenues, marking its second consecutive record year.

Fourth quarter results also showed a hefty increase in earnings, 52%, on an 8% rise in revenues.

NCR Chairman William S. Anderson said the increased profitability of the firm's U.S. operations was the principal factor in the earnings improvement but that international earnings also showed a strong gain over the prior year.

"Better margins resulted from a number of actions taken in recent years to improve the productivity and efficiency of our manufacturing, marketing and service operations," he said. "We expect this favorable trend to continue."

For the year, NCR's earnings totaled $143.6 million or $5.09 a share compared with $95.6 million or $3.60 a share in 1976.

Revenues totaled $2.521 billion compared with $2.313 billion a year ago.

For the quarter, earnings reached $59.3 million or $2.07 a share compared with $38.9 million or $1.41 a share in the same period last year.

Fourth quarter revenues amounted to $774.3 million compared with $715.8 million in the year-ago period.

During the year, the firm reduced its long-term debt by $112 million. Working capital was increased from $775 million to about $865 million.

In 1977, the firm's product development expenditures totaled $118.1 million, an increase of 25% over $94.3 million the previous year.

"We are anticipating contiued growth in demand in our major markets and a favorable business climate in most countries. These factors, in combination with our many new products and continuing emphasis on cost control, should produce very satisfactory progress in 1978," Anderson commented.

NCR's board of directors raised its quarterly dividend rate 25% to 25 cents a share and declared a dividend at the higher rate payable to shareholders of record March 17.

# Earnings Rise 16%, Revenues 12% For Burroughs in Record Year

DETROIT — Burroughs Corp. was among those turning in record performances in the fourth quarter and in 1977.

For the year, earnings rose 16% while revenues grew 12%.

In 1977, revenue from worldwide operations totaled $2.127 billion compared with $1.902 billion in 1976. Rental and service revenue increased 14%, and revenue from the outright sale of products increased 10%.

Earnings for the year totaled $215.2 million or $5.31 a share compared with $185.9 million or $4.62 a share in 1976.

Fourth-quarter revenues rose 15% to $679.1 million compared with $589 million in the year-ago period.

Earnings for the quarter also rose 15% to $94.1 million or $2.32 a share compared with nearly $82 million or $2.04 a share in the 1976 fourth quarter.

Worldwide incoming orders during 1977 increased 12% over those of 1976, with orders in the fourth quarter showing a continuation of the improvement trend recorded in the second and third quarters, according to Chairman Paul S. Mirabito. Worldwide backlogs at year-end increased 15% over year-end 1976, he said.

During the year, the firm reduced its total debt to a level of less than $400 million.

# Memorex Net Higher Than Ever

SANTA CLARA, Calif. — Memorex Corp. reported record earnings and revenues for 1977.

Revenues rose 31% to $450.1 million compared with $344.6 million in 1976. Earnings for the firm rose to $56.3 million, or $8.87 a share, including a tax credit of $22.2 million, compared with $40.1 million or $7.10 a share last year when there was a tax credit of $15.2 million.

Results also rose for the fourth quarter, when revenues totaled $124 million, up 24% over the $100.1 million in the comparable 1976 period.

Earnings for the quarter totaled $15.4 million or $2.37 a share, including $5.9 million from tax credits.

Memorex and the Bank of America revised their financial agreement regarding senior debt to permit reborrowing of any voluntary prepayments.

By the end of the year, the firm had made prepayments of $26 million, reducing senior debt to $42 million.

Largely as a result of these prepayments, cash and temporary investments were reduced from $43.8 million at year-end 1976 to $12 million at year-end 1977, the firm said.

Total indebtedness, including Memorex's 5.25% convertible subordinated debentures, due 1990, has been reduced by $45 million to $113 million at year end.

# Profits Down At Microdata

IRVINE, Calif. — Microdata Corp.'s first-quarter earnings declined compared with those of the year-ago period, but profit margins on product sales increased.

The firm earned $640,000 or 29 cents a share compared with year-ago figures of $687,000 or 31 cents a share for the period ended Nov. 30.

Revenues dropped to $9.4 million from $9.6 million in the same quarter last year.

Product sales were down to $7.5 million from $8.5 million in the year-ago period, but services and other revenues almost doubled to $1.9 million from $958,000.

Microdata said its profit margins on product sales rose to 45% from 38% in the fourth quarter of fiscal 1977. The firm's consolidated tax rate declined to 20% from 43% because of increased Puerto Rico profits, the firm indicated.

Service revenues rose 113% over the first quarter of 1977 and the firm's backlog as of Nov. 30 was about $19 million.

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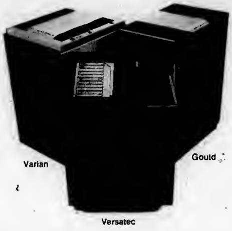

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CW-E-1

# Bubble Memory Sales Seen Thriving by '80s

WELLESLEY, Mass. — Starting from a few sample shipments in 1977, sales of magnetic bubble memory systems will grow to $3.38 million by the end of the year and to $231 million by 1983, according to an industry marketing report published recently by Venture Development Corp. (VDC).

By the mid-1980s, the market for bubble memories could exceed $1 billion if manufacturers can make the products cost-competitive with moving head disks, the market research firm added.

### Bubbles vs. Disk

Almost 90% of the sales magnetic bubble memories are expected to generate during the next five years will come at the expense of rotating disk drives, especially the fixed-head disk variety. "Whether in telephone central stations and PBXs, airborne computers or industrial and commercial fixed-head disks, bubble memories provide the same virtues as the head-per-track disk, but in greater degree — faster access, greater ruggedness and reliability — at a comparable cost," the VDC report concluded.

### Superiority

Because of this functional superiority, the emerging bubble technology will have a "devastating" effect on the fixed head disk business, the study added.

Damage to the floppy disk industry will prove much less serious. "Bubble memories will encroach on floppies only in applications for which floppies would be a doubtful choice, either because removal of the diskette itself for archival storage is not contemplated or because the environment — temperature, atmospheric conditions or mechanical stress — are beyond the floppies' capability," VDC said.

### Up 33%

Annual growth in the floppy disk drive industry will average 33% during the next five years, the report predicted.

Bubble domain memory offers several advantages over alternative data storage technologies, the study noted:

- It needs no maintenance and has no parts that can fail mechanically.
- It will provide long-term stability and reliability two orders of magnitude greater than the performance of the best disks. Some scientists have credited bubble memory systems with error rates of less than one in 100 trillion bits and with the capacity to retain stored data for 100 years.
- It will offer much higher data density, be much smaller and lighter and prove much more rugged than disk drives.

Only in data transfer rate will disk drives outperform bubble memory systems, and the newer technology will compensate for that disadvantage by providing superior access time, the study asserted.

### Major Applications

Partly because of these capabilities, bubble memory systems will prove especially well suited for use in industry, data processing, the aerospace field and other nontelephone applications, VDC continued. In fact, these areas will account for about 56% of all bubble memory revenues in 1983.

The remaining systems will probably go into telecommunications networks, where a high premium is placed on reliability and freedom from mechanical defects. One likely telecommunications application for magnetic bubble memories is as replacements for the fixed head disks that telephone companies use in large quantitites in their central switching offices, the study predicted.

### Voice Uses

In fact, such systems are already in use at a Detroit telephone office for recording voice announcements, and they will eventually become commonplace as components in private PBXs as well, VDC forecast.

Magnetic bubble memories will also find extensive telecommunications applications as satellite recorders, airborne computers and other military and space equipment requiring high data accuracy rates and large storage capacities, the report added.

### Telecommunications

Bubble memory systems will prove so useful in telecommunications hardware primarily because, unlike fixed head disk drives which rotate continuously, they contain no moving parts except "bubbles" of reverse magnetization that flow along loops of permalloy tracks in a garnet layer. Hence, they incorporate no components to go "out of whack," VDC explained.

### Bubbles' Place

In the spectrum of magnetic data storage products, bubble memories occupy a place somewhere between very fast random-access memories and relatively slow disk drives. For short-term storage of moderate quantities of data, semiconductor technologies like charge-coupled devices will prove more practical because of their faster access, high data transfer rates and simpler interfacing requirements.

"But where nonvolatility and exceptional reliability are required, the bubble domain memory is the logical choice," VDC concluded. The firm is located at One Washington St., Wellesley, Mass. 02181.

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### *DeCastro Cites Economic Reasons*

# DG Planning More Expansion Outside Mass.

BOSTON — Data General Corp., which has been expanding at a vigorous rate in areas outside of Massachusetts, intends to adhere to that pattern for the immediate future, according to President Edson D. deCastro.

In explaining to stockholders the reasons for DG's selection of out-of-state sites, he said, "We continue to view the state as uneconomical for further major expansion of our operations aside from the necessary enlargement of our headquarters and administrative activities.

"The climate for industrial growth shows little improvement in substance, despite increased attention paid to the problem by many of the state's leaders," he continued.

"Our experience in expanding in other states has justified our original reasons in locating there. We have found a more cordial and cooperative attitude on the part of local and state officials in working with industry.

"And the lower per capita tax burden at these locations has proved more attractive for employees, both direct labor and professional.

"As in any high-technology company, DG largely depends upon the skills and brains of our employees and our ability to attract new ones in considerable numbers," he remarked.

"The Boston area, because of its fine educational institutions, has long been a center for such people, but it no longer has a monopoly. Many other areas now develop and attract these people. And many of these areas have more attractive living standards and better tax structures."

DG has "no intention of curtailing our operations here or moving large numbers of employees to other states as other industries have done. And we intend to work within the state to improve its economic circumstances as best we can. However, we have concluded that our future expansion lies largely elsewhere for now," he said.

DG's facilities in other states include a 134,000 sq-ft assembly plant in Westbrook, Maine, a 105,000 sq-ft facility in Portsmouth, N.H., and two sites in North Carolina. These include a 58,000 sq-ft R&D facility and a 135,000 sq-ft manufacturing facility scheduled to be in operation in March.

DG has a semiconductor facility in California and the firm plans to build a 150,000 sq-ft building for assembly and product development work in Austin, Texas.

In addition, the firm has assembly and packaging operations in the Far East.

During the year, the company expects to add another 666,000 sq ft to its 1.6 million sq ft of plant, an increase of over 42%, according to Paul Stein, vice-president of manufacturing.

# Banks Barred From Providing DP Services

CINCINNATI — Federal home loan banks cannot provide DP services, according to a decision by the U.S. Court of Appeals, Sixth Circuit.

The 3-0 decision came in the four-year-old case brought by the Association of Data Processing Service Organizations (Adapso) and United Data Processing, Inc. against the Federal Home Loan Bank Board (FHLBB). Five districts intervened in the case on behalf of the FHLBB.

The original ruling was handed down by Federal District Judge Carl B. Rubin.

The Appeals Court ordered the district court to hold a hearing concerning the divestiture of the banks' DP services. The FHLBB said it will not take the issue to a higher court.

Adapso had filed the case against the FHLBB because banks were providing DP services to savings and loan institutions.

Adapso contended that the federal home banks' exemption from taxation "constitutes a form of unfair competition."

Rubin ruled that the "providing of data processing services to member institutions is not an express power granted to the federal home loan banks or Federal Home Loan Bank Board" by the 1932 act.

# Telecredit, TRW Make Settlement

LOS ANGELES — TRW, Inc. and Telecredit, Inc. said they have settled out of court Telecredit's patent infringement suit against TRW and TRW's counterclaims.

Telecredit will seek a reissue from the Patent Office of two of its patents in the credit-checking field and TRW has an option for a nonexclusive, paid-up license on each of these patents for $200,000 each.

In addition, TRW has an option to take a similar license of Telecredit's magnetic strip patents for another $200,000. Both firms agreed TRW does not currently have a product that infringes these patents.

# "We have not yet begun to distribute."

**A Special Report on Distributed Data Processing in our February 27th Issue**

According to independent studies by Becker Research, Inc., only 20% of *Computerworld* subscribers' organizations "currently use a distributed approach to data processing," so the buzzword of the late 70's has yet to become a byword.

On the other hand, 27% of *Computerworld* subscribers say their organizations are now "planning to use a distributed approach to data processing" — which indicates a substantial current interest in what some have called the wave of the future.

Of course, there are still wide differences on just what is meant by distributed data processing. And that's one of the topics to be covered in our February 27th Special Report.

Edited by Esther Surden, this report will gather opinions on what DDP is from several sources, including mainframe manufacturers and users.

It will also give some practical help to DDP users and prospective users — with articles on configuring networks, distributing data bases, and selecting and maintaining equipment.

*"Distributed Data Processing"* will also report on users' experiences with DDP — both pro and con.

If you're into DDP, planning to be into it, or thinking about it at all; this report is the place to be when our February 27th issue reaches your desk. Closing date is February 10th.

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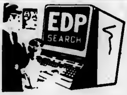

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| **Fort Worth** | 817/338-9300 |
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| **New Orleans** | 504/561-6000 |
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| **Los Angeles** | 213/386-5500 |
| **Oakland** | 415/444-5955 |
| **Palo Alto** | 415/326-7155 |
| **San Francisco** | 415/434-2410 |
| **Seattle** | 206/454-6400 |
| **Torrance CA** | 213/540-7500 |
| **Canada:** | |
| **Toronto** | 416/364-2919 |

source edp

If unable to call, write: Source Edp, Department C3
721 Enterprise Drive, Oak Brook, Illinois 60521

(When writing, please be sure to use home address and indicate position title.)

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# TEAMWORK MAKES INCOTERM SPECIAL

**You won't be working at INCOTERM for a long time before you discover that our successes are team successes - that we work together - sharing ideas to make better products in more profitable ways. The kind of comraderie and feeling of belonging is very special and we'd like to share its quality of being special with you.**

**INCOTERM intelligent terminals are being used in the railroad, airline, insurance, banking, freight, trucking and financial industries and by government, too. They touch all of our lives. They got that way by being good products, programmed by the best in the business and maintained by people who care. If you are good at what you do and care about the quality of your work, you could be an INCOTERM team member and we would like to talk with you about your possible contributions to our team efforts.**

**Currently available positions are for:**

## Systems Programmers

Exciting state-of-the-art development opportunities are available for systems programmers who want in-depth insight into the workings of our systems. Areas in which you will be involved are cross-assembler development, macro-processor development and the general development and enhancement of Programming Development Systems. These positions require a minimum of 3-5 years system experience and familiarity with the PDP-11/70. Exposure to the UNIX Operating System is highly desirable.

## Diagnostic Programmers

You will be responsible for the development of comprehensive diagnostic routine for a variety of processors, peripheral devices and applications for our current product line and new product development. Software will include off-line diagnostics, micro-diagnostics, test operating systems, fault detection monitor and special purpose test bed program. Experience with LSI and semi-conductor devices and working knowledge of assembly language required.

## Applications Programmers

You will be heavily involved in the development of customer software for areas such as banking systems, data entry, airline reservations and other similar real-time terminal applications. 3 years real-time assembly language with minicomputer experience required. Communications, teleprocessing, remote batch, IBM 3270, Burroughs TD820, Uniscope 100 300, VIP 7700 exposure helpful.

## Compiler Development

The ideal candidate will have a BS or MS in Computer Science and at least one year experience in compiler development. He or she will know at least one block structured language (ALGOL, PL/1, PASCAL, BLISS). Some assembly language programming experience, particularly on minicomputers, is desirable. Most important, a penchant for producing clear, well-documented and thoroughly checked out codes and ability to work with others and to contribute to a group effort is essential.

## Software Writer

Your assignment will be to research, write and edit technical publications such as programmer reference manuals, user manuals and other product documentation. A programming background will be an asset to the ideal candidate as our software documentation assignment involves close contact with our programming staff. An understanding of the applications of digital related equipment and the ability to effectively communicate this to others required.

We offer advanced, diversified assignments, competitive salaries, superior benefit package and a people-oriented attitude that permeates our entire corporation

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## FACULTY POSITION IN COMPUTER SCIENCE

Applications are invited for a faculty position (Assistant Professor) in the Department of Computer Science starting in August, 1978. Candidates should have a Ph.D. in Computer Science but applicants with a Master's Degree in Computer Science will also be considered. Experience working with mini-computers, micro-computers, operating systems and data structures is desirable. Duties will include teaching undergraduate Computer Science courses, committee work and some research. A Master's program in Computer Science is currently under consideration.

Salary dependent upon qualifications and experience, and other benefits will be competitive. Applications should be received by March 1, 1978.

The University of North Dakota is an Equal Opportunity/Affirmative Action Employer.

Send resume to:
Dr. Mok Tokko, Chairman
Computer Science Dept.
University of North Dakota
Box 8181, University Station
Grand Forks, N.D. 58201

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## Production Control Manager

An Iowa-based firm is actively seeking candidates for a production control management position. Candidates should have a B.S. in either Mathematics or Computer Science, and knowledge/experience in computer operations. A minimum of 3 years' experience in related areas such as production control, customer service, production and computer scheduling systems, and manpower and computer forecasting is also essential. The successful candidate will be able to communicate well in both written and verbal form, possess demonstrated management abilities and experience, and quickly grasp and assume this key management position. Salary range for this position is $18,000-$22,000 per year.

Interested qualified candidates should contact Mr. Dave Seibel of the Job Service of Iowa, 1810 Lower Muscatine Road, Iowa City, Iowa 52240.

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## EDP OPPORTUNITIES

**FOCUS**/Ramis financial modeling Fortran/Cobol CMS $25K+
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**SR SYSTEMS** Anal-graphics, new applicants design 370 CICS $27-29K
**DOS/VS** CICS DL1 370/138-major new application expansion $23-26K
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- Distributed Data Base Management Systems.
- On-line System Diagnostics.
- Sustain and Enhance Present Software.
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- Advanced Data Communications Software.

### Data Communications Analysts
Design software and be responsible for the implementation of asynchronous and synchronous protocols. Design transaction oriented systems, Distributive Communications Architecture, and front-end processors. Project Management opportunities. Direct assembly language experience required.

### Data Communications Analysts
Estimate time and cost of Data Communications software for customers. Evaluate customer software RFQ/RFP's, design creative solutions for customer's needs, and provide state-of-the-art technical leadership.

### Diagnostics Analysts
Individuals will be members of hardware/software design team involved in mini-computer test systems development. Positions will include project responsibility for all phases of assembly language and microprogramming language implemented programs and development of system level testing and fault-isolation software.

### Custom Applications Analysts
Position responsibilities will include industrial automation, distributed processing networks, assembly and high level language, on-line transaction systems, Data Base Management Systems, proposal writing, specification design and project management.

### Special Software Design Analysts
Provide real-time systems programming, special interfaces/device drivers, diagnostic hardware/ software, project control, cost estimates and assembler languages.

### Performance Measurements Analysts
Establish procedures and develop necessary tools to perform the system measurements of our on-line transaction oriented system and analytic and simulation modeling.

### Software Applications Analysts
Conduct pre/post sales software support for Mini-Computer Operations products, including benchmarks, performance analysis and competitive analysis. Requires direct experience in Operating Systems, Data Base design and high level languages.

### Operating Systems Analysts
Design and development of data communications software for operating systems development, DBMS design/implementation, use of DBMS in distributed environments, on-line teleprocessing and line and network protocols.

### Software Sustaining Analysts
Provide enhancement and support of operating systems, Telecommunications systems and Fortran Compilers.

**We offer competitive salaries and a comprehensive benefits package that includes dental insurance. We invite you to send your resume to the address below, or call 714/833-2400 for more information.**

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## ENGINEERS AND PROGRAMMERS

Lockheed Electronics Company is seeking qualified applicants for immediate positions at NASA's Johnson Space Center in Houston, Texas. These positions are in support of the Space Shuttle and Earth Resource Programs and require applicants experienced in the following areas:

### PUBLICATIONS SPECIALIST:

To originate scientific/engineering publications and coordinate efforts of editors and proofreaders. Prefer applicants with a minimum of eight years experience.

### DIGITAL DESIGN ENGINEERS:

With experience in design and development of digital/analog equipment including computer interface, display, control and signal conditioning hardware.

### MECHANICAL/AEROSPACE ENGINEERS:

Responsible for structural, thermal or environmental control systems analysis. Applicants should have knowledge of FORTRAN computer programming, math modeling, and be capable of using large scale digital computers in the analysis of engineering problems.

### SIMULATION APPLICATIONS:

Required to support dynamics simulation development and operations. Experience required in realtime, digital, analog and hybrid computer program development and operation of large man-in-the-loop simulations. Prefer applicants who have worked with spacecraft/aircraft GUIDANCE and CONTROL systems.

### COMPUTER MAINTENANCE ENGINEERS:

To be cross-trained to support a large, diverse simulation laboratory. Facility includes analog computers, minicomputers and second and third generation medium-to-large scale systems manufactured by several companies.

### CONTROL SYSTEMS ENGINEERS:

With experience in flight controls; guidance, navigation and controls; digital design; computer interface, and data systems programming experience on HP 2100 computers.

### PROGRAMMING ANALYSTS:

Responsible for performing analysis and developing appropriate computer models. Experience in FORTRAN IV and ASSEMBLY language required. Some positions require UNIVAC 1108 programming experience.

### COMMERCIAL/BUSINESS APPLICATIONS PROGRAMMERS:

With experience in design, development of financial, accounting and control systems using COBOL, FORTRAN, or ASSEMBLY languages.

### STATISTICIANS:

With advanced degree and experience in pattern recognition, clustering, feature selection, discriminant or multivariate analysis.

Send resume in confidence to Bill Jancha at Lockheed Electronics Company, Dept. C-20-8, 1830 NASA Road #1, Houston, Texas 77058.

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## Product Specialists

Extel Corporation, one of the leaders engaged in the design and manufacturing of telecommunications terminals, has several excellent opportunities available for Product Specialists with data communications background.

Responsibilities include coordinating the introduction of new products, interfacing with marketing, sales, and worldwide customers, writing of engineering specifications, hardware/software coordination and numerous other challenging duties.

In addition to a growth potential, we offer an excellent starting salary and benefit package. If interested, please submit resume of work and salary history, to:

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[illegible], Inc.
[illegible] Asylum Avenue
Hartford, Connecticut [illegible]

LOS ANGELES
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Los Angeles, California 90010

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Minneapolis, Minnesota 55402

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## SOFTWARE SYSTEMS PROFESSIONALS

### If you're looking for the opportunity to create superior software systems...

rush your resume to General Electric Nuclear Energy Business Group. We're looking for resourceful, conceptual thinkers with electronics or mechanical engineering background to develop and maintain a variety of new systems. Openings for:

### SYSTEMS PROGRAMMER
**CYBER Systems Development**

Develop and maintain systems software, utilities and libraries on CDC CYBER 76/6400 multi-main frame system. Requires extensive relevant experience in machine and compiler languages and in-depth knowledge of scope 2.1 or NOS/BE operating system intervals. Specific experience with disc or tape subsystems or Honeywell H6000 a plus.

### SOFTWARE ENGINEER
**Mini-computer/Communications**

Develop and maintain disc operating system capable of driving a high speed data link and performing high volume media processing. Requires extensive experience programming mini-computers and communication devices, and experience in systems programming and assembly language. Background with Honeywell level 6 computers, and related BS degree desirable.

### PROGRAMMER
**Thermal-Hydraulics**

Work with users of heat transfer and fluid flow analysis programs and utilize your resourcefulness and thermal hydraulic experience to develop new numerical and application techniques. Computers utilized are large scale Honeywell 6080's and CDC 7600. Requires MS/ME (or equivalent) and 1-3 years relevant experience in computer program development of large thermal hydraulic systems.

Our benefits/compensation package is excellent. And after hours, there's no hassle. San Jose's life style is easy. We're blessed with a temperature climate and can offer a variety of cultural/recreational activities to suit individual tests. Write in confidence, including salary history, to Miss J.L. Mitchell, M/C 324, General Electric, Ref. 48-E, Nuclear Energy Business Group, 175 Curtner Ave., San Jose, Ca. 95125. An equal opportunity employer.

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## DATA PROCESSING PERSONNEL

EG&G Idaho, Inc.,
the prime operating contractor
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has immediate opportunities for:

## COMPUTER PROGRAMMERS

Candidates should have a college degree or equivalent, and a minimum of 1 year experience in the development and implementation of business and management information systems along with proven capability in ANS COBOL. Experience with MARK IV and/or DBMS and knowledge of JCL for OS/MVT is desirable.

Idaho Falls is a medium-sized community located close to top-flight winter sports areas (Sun Valley, Jackson Hole, Grand Targhee) and unexcelled summer recreation areas (Yellowstone, The Salmon and Snake Rivers, The Grand Tetons).

If intersted and qualified, please submit resume including salary history and requirements, in confidence, to:

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SUN BELT
OPPORTUNITIES

# Systems Programmers

**Software Development**
**Software Test**
**Software Support**

As the leader in dispersed data processing, Datapoint Corporation continues to grow. We have openings in the Software Operations at corporate headquarters in San Antonio, Texas for qualified systems programmers. Applicants should have a minimum of two years experience in software development or support environment in at least one of the following areas: operating systems, data communications, or language systems. These positions offer excellent compensation and fringe benefits, good opportunity for advancement and a stimulating work setting.

San Antonio is the westernmost hub of the Texas Golden Triangle and along with Houston and Dallas is the center of a thriving electronics industry. The progressive business climate is further stimulated by favorable tax policies (no state or city income taxes). San Antonio offers an excellent year round climate, fine schools, and outstanding residential areas. Plus it's only a short drive away from the famed Texas Gulf Coast and its numerous resorts, and from sunny Mexico and its many vacation spots.

So if you're a qualified candidate, come to where the action and the good living are. Send your resume and salary history in confidence to **Mr. Charles Zeleny, Operations Personnel Manager, Datapoint Corporation, 9725 Datapoint Drive, San Antonio, Texas 78284.**

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The leader in dispersed data processing
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## San Diego opportunity in

# SOFTWARE SYSTEMS DEVELOPMENT

Want to combine the ideal career opportunity with your favorite lifestyle? NCR Systems Engineering/Torrey Pines needs your help now in developing advanced, high-technology, EDP systems for customers around the world. You'll be doing important work in our Sorrento Valley facility, just three miles from the ocean and only minutes from Torrey Pines, La Jolla and downtown San Diego. You can live in the setting of your choice — beach, valley, mountain, country, small-town or urban — and still be only a short drive from work. Spend your leisure hours golfing, swimming, hiking, getting advanced degrees from major universities, attending theatrical, music, art and sports events, or soaking up the year-round sun. Pick your climate, too — from mild coast to dry desert. San Diego is a place of extraordinary choices — and right now the choice is yours.

## COMPUTER PROGRAMMERS

The Systems Engineering/Torrey Pines Division has opportunities for software professionals in a broad range of disciplines and in all experience levels. Our current and firm future programs require top people with experience in any of the following areas:

- **Telecommunications Software**
- **File Processing**
- **Network Development**
- **Large Mainframe, Mini and Micro Processor**
- **Operating Systems**
- **COBOL Applications**
- **Assembly Language**

Assignments will include the development and implementation of various EDP systems for specific customers as well as the development of future NCR total systems; both requiring state-of-the-art knowledge.

Our benefit package is what you would expect from a major blue chip corporation. What you might not expect is the relaxed and very creative environment of this small, highly specialized division. The facilities are modern, comfortable, designed to provide an atmosphere in which every employee can achieve an uncommon degree of personal and professional satisfaction. May I offer you the opportunity to judge for yourself? Please send your resume (with salary history) to me.

NCR

Thom Harris, Employment Specialist
SYSTEMS ENGINEERING/TORREY PINES
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## PROGRAMMERS AND SYSTEMS ANALYSTS

***Put Your Experience To Work For You***
***In Building A Better Career Opportunity***

Sperry Univac has a variety of challenging opportunities waiting for you at one of our Minneapolis locations. These openings exist within our Airline Industry Development Center which designs and supports applications such as reservations, ticketing, cargo, departure control, message switching, check-in, hotel and fare quote. We are searching for candidates with 2 to 8 years experience in the following disciplines:

- **Design, implementation and support of real time applications,**
- **Acceptance testing of application programs,**
- **Technical support in the customer environment.**

In addition to requiring experience within the areas mentioned above, it is also desirable to have a background in FORTRAN, and/or general UNIVAC 1100 series exposure.

We offer highly competitive starting salary, a comprehensive benefits program and outstanding professional and personal growth opportunities.

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DIRECT YOUR RESUME TO:
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## FIELD SERVICE

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## IMS DB/DC

We seek systems and applications professionals to develop and install large integrated systems.

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- **Teleprocessing**
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- 2+ years experience using digital computers in the petrochemical field.

### PRODUCT SPECIALIST

- Will provide marketing and post sales support for microcomputer real time basic process control systems. Process control and/or real time computing experience is preferred.

### REAL TIME PROGRAMMERS

- Process control communications experience or related areas. Background in FORTRAN and/or BASIC languages.

### PROJECT MANAGER

- 5+ years of project management or supervision of hardware/software engineers on process control projects. Will be responsible for projects which include budgets and customer interface.

We are seeking professionals with a desire to work in a progressive, innovative environment. Metromation, Inc. supplies the petroleum and chemical industries with sophisticated mini-computer systems on an ever-increasing scale. We offer you, commensurate salaries and a comprehensive benefit package. If you would like the opportunity of participating in such a challenging environment, send your resume in confidence to: Metromation, Inc., 1101 State Road, Princeton, N.J. 08540 Attention: Employee Relations Department.

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## COMPUTER PERSONNEL

### PROGRAMMER/ANALYSTS

**Business Applications, Scientific Applications**

Real time processing systems experience desired. Software development support duties. Degree in Computer Science with three to five years experience preferred, although some entry level positions are available.

We have been engaged by our client companies to fill the above positions.

These and other key opportunities are fee paid. Please send resumés for consideration to:

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As a Control Data Marketing Representative, you will represent the leader in the peripheral products market. Control Data is the only company offering a total line of memory, disk (including Winchester technology), tapes, mass storage, printers, and plug competible CPU's.

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# RPG/CCP
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We have been retained by a rapidly expanding leader in the manufacture of bio-medical instruments offering excellent job opportunities for data processing professionals. You will assist in developing sophisticated systems on their IBM System 3 Model 15D computer with over 30 terminals.

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**RPG II Programmer/Analyst**

Design, program and implement large scale manufacturing systems utilizing BOM, and MRP with emphasis on Inventory Control with systems design.

**CCP Programmer**

Design, program, and implement an array of in-house multi-functional CCP/CRT applications - (eg., Order Entry, Marketing, Financial, etc.).

## General Requirements

B.S. or equivalent preferred, minimum 2-4 years programming experience, possess excellent knowledge of RPG II.

Suburban location, with evening or weekend appointments arranged for your convenience.

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**SOFTWARE ENGINEERS**
**SYSTEMS ANALYSTS**
**PROGRAMMER ANALYSTS**

Well known leader in public policy research & experimentation has multiple openings at all levels of systems design & implementation including SOFTWARE ENGINEERS, SYSTEMS ANALYSTS & PROGRAMMER ANALYSTS.

Project assignments & desirable qualifications cover a broad range of computer science & systems application experience. Positions require ability to apply computer technology to design & implementation of data processing & computer system support within inter-disciplinary projects. Projects include large scale innovations in administrative automation for public welfare programs in several states.

We are looking for people who can make creative contributions & will respond to, and grow with, challenging opportunities. Range of desirable qualifications:

- broad background in computer technology, including hardware analysis, operating systems, communications, on-line environments.
- experience in systems development, including design of processing flows, file management & file design
- experience with minicomputer hardware, operating systems & programming languages; experience with UNIX/C language desirable
- solid analytical experience with commonly used high level programming languages
- computer science or other relevant degree desirable

Candidates can expect salaries, assignments & growth dependant on their contribution & qualifications. Competitive benefits. Positions available in Princeton, New Jersey, Denver, Colorado, and Montpelier, Vermont.

Please supply resume, salary history and locational preference to CW Box 1411, 797 Washington St., Newton, Mass. 02160.

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# Career Openings in Information Systems

Public Service Company of New Mexico has immediate openings with excellent opportunity to participate in the design, development and installation of state-of-the-art business and engineering systems.

## SUPERVISOR, TECHNICAL SUPPORT

Successful applicant will direct a small staff providing hardware/software support of a Honeywell L6640 system. Minimum requirements are:

- 3-5 years large Honeywell systems experience
- 2-3 years experience at GCOS level
- heavy FMS, IDS, TDS, COBOL experience a plus
- supervisory experience desired
- degree or equivalent

## SYSTEMS ANALYST

Successful candidate must have good analytical skills and a solid background in systems analysis. Background requirements are as follows:

- Bachelor's degree (preferably in business, math, computer science or accounting)
- minimum of 2 years COBOL and/or FORTRAN experience
- minimum of 3 years analysis experience
- experience in development and installation of large business applications a plus

## SUPERVISOR-SYSTEMS ANALYSTS

Successful candidate will direct activities of a staff involved in the development and installation of business and engineering applications. Minimum requirements are:

- Bachelor's degree (preferably in business or accounting)
- 2 years programming experience in COBOL and/or FORTRAN
- 2-3 years experience in systems analysis
- 2-3 years supervisory experience
- good communications skills
- project management experience a plus

## COBOL PROGRAMMERS

Candidates must be experienced in COBOL programmers. Background requirements are as follows:

- Bachelor's degree preferred
- minimum 3 years COBOL application programming experience
- ability to develop and document procedures (including JCL)
- knowledge of Honeywell IDS and TDS is a plus
- experience in development and installation of large business applications a plus

## METHODS AND PROCEDURES ANALYST

Successful candidate will participate in design of management information systems at the points of external interface to insure that manual procedures are designed properly. Background requirements are as follows:

- Bachelor's degree (preferably in business or management)
- 2-3 years experience in work methods, forms, work flow and procedure development
- must be familiar with development of automated and manual systems

PNM has a Honeywell 66/40 system with 384K, TDS, MDQS, NPS supporting batch, time-sharing and many interactive applications. Send resume with salary requirements to:

Personnel Department
**Public Service Company of New Mexico**
P.O. Box 2267
Albuquerque, NM 87103

PNM

**PUBLIC SERVICE COMPANY OF NEW MEXICO**
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# ASSOCIATE DIRECTOR COMPUTING CENTER

The Computing Services Division (CSD) of the University of Wisconsin-Milwaukee (UWM) is seeking an Associate Director. With its 25,000 student enrollment, UWM is a doctoral degree granting institution, whose multi-faceted mission includes service to the urban area. CSD, with a staff of 67 persons, is a service agency providing a full range of computing services to both the academic and administrative areas.

A new commitment to campus computing in both personnel and resources generates a challenging environment requiring broad administrative planning and analytical skills. Currently operating on an IBM 360/50 and a Univac 1106, CSD will be moving to a combined academic and administrative operation on a Univac 1100/80.

Along with assisting in the day to day operations, the Associate Director will be responsible for developing long range plans, formulating policy, writing position papers, modeling alternatives and determining organizational thrust. A minimum of a Bachelor's degree, a sufficient number of years of relevant experience, and a good knowledge of computing is essential. The position requires a high level of communication skills, the ability to think problems through and to analyze thoroughly. Clear and effective writing are highly prized. Experience in managing computer services in a university environment and a high degree of administrative competency are desirable. As the Director's alter ego, a broad grasp of university computing must be acquired if not present. The successful candidate must be able to work independently with a minimum of supervision. Sensitivity, tact, and appreciation of a professional environment are required.

Salary commensurate with ability and experience. This is an administrative position reporting to the Director. Please send resume, including salary requirement, by February 15, 1978, in confidence to: Director's Screening Committee, University of Wisconsin-Milwaukee, Computing Services Division, P.O. Box 413, Milwaukee, Wisconsin 53201. An Equal Opportunity/Affirmative Action Employer.

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# DATA PROCESSING PROFESSIONALS

With offices and openings in Chicago, Milwaukee, Houston and Dallas, SPR is actively seeking professional technical representatives to augment its rapidly expanding staff.

Through our incredible performance record, SPR has emerged as a leading provider of human resources to the data processing community.

Several positions are available in all 4 SPR locations:

- * PROGRAMMERS
  With at least 5 years COBOL or BAL experiance.
- * PROGRAMMER/ANALYSTS
  With CICS or IMS experience.

SPR has firmly established a people-oriented reputation, as evidenced by one of the lowest turnover rates in the industry. Systems and Programming Resources:

- * Pays for Overtime
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- * Provides State-of-the-Art Education
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If you're career expectations haven't quite been met, if challenging and diversified project assignments appeal to you, and if recognition for professional performance is desirable join the leader - SPR.

**CALL (312) 654-4188**
**or send a resume in confidence to:**

## SYSTEMS & PROGRAMMING RESOURCES, INC.

**1211 West 22nd Street - Room 600**
**Oak Brook, Illinois 60521**
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SPR

# WANG Needs Professionals

## FOR OUR OPERATIONS IN:
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### Software Technical Writers

Experienced technical writers to participate in the documentation of a major new computer and word processing system. The successful candidates should have at least 1-3 years experience in systems software documentation or a related field. (Programmers with an interest in writing are invited to apply.) Knowledge of high level programming language a must. Knowledge of an assembler level language a definite plus.

## BURLINGTON

### Systems Programmer

State-of-the-art data center is seeking a systems programmer to support our IBM 370/158 running under VS2 (SVS). This position requires 1-2 years experience with OS or VS modifications or maintenance. Degree in computer science with emphasis in operating system design may be substituted for experience. Assembler language is required; experience in any of the following areas is a plus: HASP, JES2, WYLBUR. Opportunity to get into MVS.

Excellent salaries and earning potential plus superior company benefits. Please send resume including academic background and salary history and requirements to:

**Linda G. O'Connor**
**Career Opportunities**
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We are an affirmative action/equal opportunity employer.

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Join the new Victors. A progressive manufacturer is the electronic business equipment field. You'll find a different and exciting DP environment where innovative ideas are encouraged and recognized. We're pushing forward with new applications and systems, backed by strong support from new management. We're working with the latest in Data Base and Telecommunications (DL 1 and CICS) in an IBM 370/148, DOS/VS installation. The MIS demand is at an all time high - new openings are available for the following:

- SOFTWARE SYSTEMS PROGRAMMER
- PROGRAMMERS (COBOL)

Positions require financial, general business and/or manufacturing applications experience.

If you're ready to make a change - find out about the differences that a Victor career has to offer. Send resume, including salary history and requirements to: Staffing Department 840, Victor Business Products, 3900 N. Rockwell St., Chicago, IL 60618.

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# Computer Science

Three faculty teaching positions will be available beginning September, 1978 or January, 1979. One of these positions requires the teaching of applied Computer Science courses with a particular emphasis on Business Data Processing, the two others require teaching undergraduate Computer Science courses. All three positions are eligible to be on the tenure track.

At least one position requires a PhD in the area of Computer Science. Individuals holding an appropriate terminal degree with Computer Science as a major component in the program, or individuals with a Master's degree in the area of Computer Science and with significant experience in a computer related field are also encouraged to apply.

Salary, rank and type of appointment will be commensurate with experience and credentials. Send resumes and a list of all graduate courses taken, postmarked by March 7, 1978 to: Edward Michael Stemen, Christopher Newport College, PO Box 6070, Newport News, Virginia 23606. Christopher Newport College is an AA/EO Employer.

# Making Machines Do More
# So Man Can Do More

SPERRY UNIVAC a world leader in the computer industry, has career opportunities for individuals with experience in the areas of:

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Applicants should have 1-3 years systems experience. Positions are available in the middle Atlantic, New York Metropolitan and Northeast areas of the U.S.

For immediate consideration, submit your resume in strict confidence to:

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# SYSTEMS ANALYSTS

Expansion of our Systems and Programming Department has created the need for two additional systems analysts to work on REVENUE ACCOUNTING SYSTEMS. Experience required: COBOL language, large scale computer system, revenue accounting systems with very large customer base. DMSII knowledge preferred, but not required.

We offer excellent advancement potential, salary, and benefits package. If you possess the qualifications listed above and desire to demonstrate your capabilities in a creative, rapid-growth environment, please apply directly to:

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Personnel Specialist (CW)
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Persons who are committed to excellence in teaching and who would appreciate being affiliated with a thriving, independent, accredited, coeducational institution that offers a variety of specializations in business-related disciplines at the baccalaureate and master's levels are invited to apply.

Openings exist for Assistant or Associate Professors with a knowledge of at least two of the following areas: business systems analysis, COBOL, FORTRAN, DBMS, MIS, data communication, and information systems for management. Applicants are expected to present a doctorate in computer systems or a cognate field; however, full consideration will be given to ABD's and master's degree holders with an impressive record of achievement in business, industry or government.

Applicants are urged to send a current resume, evidences of effective teaching (if available), and the names and addresses, and telephone numbers of three references prior to March 15, 1978, to Vice President for Academic Affairs.

Bentley College
Beaver & Forest Sts.
Waltham, Ma 02154/(617) 891-2000
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# PROGRAMMER
# PROGRAMMER ANALYST

Career opportunities are available for individuals who desire to participate in the design, programming and implementation of new and existing business systems

A solid, experienced background with COBOL is essential Experience with POS systems on-line credit systems and NCR Century computers would be a plus but not essential

This is an excellent opportunity to develop your career with a growing company Your ability will be well compensated

Send your confidential resume to the Director of Data Processing or call 313 965-7900 ext 341

**HUGHES & HATCHER**
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# Senior Firmware Specialist

**Join INCOTERM at the right time! We are in the process of fast, smooth growth. This is a ground floor opportunity in our Special Systems Department for an experienced micro/mini assembly language programmer. Communication protocol (BISYNC, 3270, SDLC etc.) exposure is desirable. The applicant should have an innovative and self-starting personality.**

**We offer competitive salaries, superior benefit package and a people-oriented attitude that permeates our entire corporation.**

**Please send your resume to:**
**F. Joseph Dugan**
**Manager, Employee Resources**

INCOTERM CORPORATION
**...the international computer terminals people**
**65 Walnut Street, Wellesley Hills, MA 02181**
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## PROGRAMMER ANALYST

Administrative data processing, minimum two years as PL/1 or Cobol programmer with considerable progressive responsible programming experience. Considerable knowledge of systems procedures and techniques, associate degree or equivalent combination of education and experience. Salary range $12,950-$18,130. Please apply by February 10, 1978, Personnel Office, 110 Nisbet Building, Michigan State University, East Lansing, MI 48824. An Equal Opportunity Employer.

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### COMPUTER CENTER DIRECTOR WESTERN CAROLINA UNIVERSITY

Twelve-month position as director available June 1, 978. Experience in academic computing and administrative experience as director or assistant director of a computer center is required. Faculty status possible if criteria of an academic department are met. The salary will be commensurate with qualifications and experience. Complete resume and names of three references must be received by March 15, 1978. Apply to Dr. Charles Martin, Chairman, Computer Director Search Committee, Western Carolina University, Cullowhee, NC 28723 (704) 293-7245 An Affirmative Action/Equal Opportunity Employer.

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### PROGRAMMING PROJECT MANAGER

Extensive application programming including systems design. Prior supervision of technical staff of no less than five persons with multiple application responsibility. Must understand various random file access methods and structures. Direct involvement with user departments in an on-line environment involving a large data base. Programming in Cobol using Burroughs medium systems useful. Fairfield County headquarters. Please send detail resume to CW Box No. 1413, 797 Washington St., Newton, Mass. 02160.

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### PROGRAMMER/ANALYST C.C.I. EXPANDS INFORMATION PROCESSING

Dynamic direct mail service organization located in Lower Bucks Co. needs talented individuals. Self-starters only! Qualified IBM, Assembler and COBOL Analysts to design and implement complex User systems and "package" software products. (Unduplication, Generalized Utilities, Laser, etc.). Salary, benefits and potential excellent.

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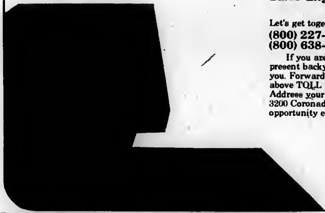

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## PROGRAMMING OPPORTUNITIES

### Colorado Springs, Colorado

We are currently seeking individuals for the following career opportunities:

### MINICOMPUTER ANALYST/PROGRAMMER

To participate in the development of real-time data acquisition and telecommunications, Microprocessors. Send resume to below address, ATTN: RS.

### SYSTEMS ANALYST

Proven ability to plan, design and implement large computer based information systems. Experience in supply/logistics and production/manufacturing systems desirable. Send resume to below address, ATTN: TA.

### PROGRAMMER

To participate in programming interactive, terminal-oriented minicomputer systems. Desire medical clinic or hospital data processing experience and data base management systems experience. Send resume to below address, ATTN: TH.

We offer excellent company benefits. Send resume in confidence to: Kaman Sciences Corporation, P.O. Box 7463, Colorado Springs, Colorado 80933.

**KAMAN SCIENCES CORPORATION**
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### SENIOR PROGRAMMER

Leading educational services organization, located in the Midwest, needs experienced Programmer to provide technical data processing related support to a major division. Candidates should have experience with some of the following components of a computer programmer or systems analyst functions: Programming and COBOL, assembler, or BASIC languages; use of IBM utilities; statistical background including a working knowledge of SPSS; familiarity with IBM 370, OS JCL, and CICS operating specifications.

We offer competitive salary, excellent benefit program, paid moving expenses. Send resume, including salary history to: Personnel Director, THE AMERICAN COLLEGE TESTING PROGRAM, INC., P.O. Box 168, Iowa City, Iowa 52240. ACT is an equal opportunity employer M/F

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## INTERNATIONAL SALES

IPS Computer Marketing Corp. is a major international dealer in used IBM computer equipment. We are looking for a marketing representative for international sales, working out of our offices in Fort Lee, New Jersey (suburb of New York City). At least five years sales experience required, with minimum of two years experience in international market. Previous sales experience should be in data-processing-related area. Prefer someone now living in New York City area. High earning potential through commissions. Some international travel required. Please send resume (no telephone calls) to G.H. Heilborn, President.

**IPS**

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## MIS-SYSTEMS ANALYST

With Sverdrup/ARO, Inc. in middle Tn. near Tullahoma requires Bachelors Degree and 10 years EDP experience in management applications (Financial, personnel, inventory systems), COBOL, systems planning and design, data base and data communications, IBM 370/OS, oral and written communications skills, and feasibility studies. Experience preferred in SYSTEM 2000, data base administration, graphics terminals, project planning, project management. Contact R.S. Shanks.

ARO, INC.
Arnold AFS, Tn. 37289
(615) 455-2611 Ext. 529
*An Equal Opportunity Employer M/F*

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## COMPUTER PROFESSIONALS

Rapidly growing computer Division of a national direct mail organization currently has challenging positions available in Falls Church, Virginia.

### SENIOR PROGRAMMER/PROGRAMMER

We seek 2-5 years ALC/BAL programming experience on IBM 360 or 370 DOS systems. Direct Mail or job shop experience an asset. The selected professionals will be responsible for interpreting management problems into DP solutions.

Our expanding operation offers excellent company benefits, growth opportunity and a convenient suburban location in the Washington, D.C. area. We also offer a company-paid relocation program. If you desire consideration for one of these results-oriented positions, send resume and complete salary history to:

Mr. Larry Brown
**Richard A. Viguerie Company, Incorporated**
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# SYSTEMS DEVELOPMENT OPPORTUNITIES

As tha international data processing subsidiary of a major financial institution. Interactiva Data Corporation's record of success has resulted in dynamic growth . . . and growth means opportunity. Installation of our second IBM System 370/168 has created some uniqua career opportunitias in our Software Department.

## SYSTEMS PROGRAMMERS OPERATING SYSTEMS

- 2-5 years' programming experience using IBM BAL.
- Familiarity with timesharing or teleprocessing systems.
- Operating systems design and implementation experience.

## SYSTEMS PROGRAMMERS DATA BASE

- 2-5 years' programming experience using COBOL.
- Experience with large data bases.
- Experience with IBM BAL preferred.

## SYSTEMS PROGRAMMERS COMMUNICATIONS

- 2-3 years' experience in minicomputer assembly language.
- Familiarity with communication network protocol.

Please send resume in complate confidence to Personnel Director.

486 Totten Pond Road
Waltham, Massachusetts 02154

**Interactive Data Corporation**

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# PRODUCT SUPPORT ENGINEERS

EMM's Computer Products Division, the leading supplier of add-on memory systems and enhancements for IBM 360/370 computers, is expanding its Product Support Group and has immediate openings for Product Support Engineers.

These positions require individuals with good communicative and administrative abilities and a high degree of technical skill. Will be responsible for technical support to our Service Organizations, Manufacturing, Engineering, Publications and Training. Travel required.

Requires a minimum of 1 year experience in a technical support capacity on medium or large scale computers. Please forward resume complete with salary history to:

Industrial Relations Dept.

EMM

ELECTRONIC MEMORIES
& MAGNETICS CORPORATION
2311 W. El Segundo Bl. Hawthorne, CA 90250

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# PROGRAMMER

If you have college training and a minimum of 2 years NEAT/3 or COBOL experience on NCR Century we would like to talk to you. Wa are an international chemical manufacturer with executive offices in downtown Cincinnati. Full range employee benefit program. Please forward complete resuma outlining axperiance, education, and salary history to:

Director of Employee Relations

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# THE SEARCH IS ON AT HONEYWELL PHOENIX

We are seeking first rata designers and implementers to augment our top software teams expanding to meet tomorrow's technical challenges.

We offer interesting work in an exciting and challenging enviornment and a total commitment to creating the best software on the market. Our pace is fast but for the qualified, the career rewards are great.

We are looking for exceptional talent with experience in the following fields:

- ADVANCED OPERATING SYSTEM DESIGN AND DEVELOPMENT (GCOS, MULTICS, etc.)
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- UNIFIED FILE ACCESS SYSTEM (LOGICAL I/O)
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- UTILITY SYSTEMS DEVELOPMENT AND TEST
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- PROGRAMMING LANGUAGES - COMPILERS & SUPPORTING SOFTWARE
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- APPLICATION DEVELOPMENT SYSTEMS
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- TRANSACTION DRIVEN SYSTEMS
- SOFTWARE SYSTEM TESTING
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In addition to unparalleled career opportunities, our location offers a living environment equal to tha work environment . . . hard to beat!

## The future is now and Engineering is the key.

Please send your resume with salary history to:

Manager, Recruitment & Placement
Mail Station Y-130
Large Information Systems Division
P.O. Box 6000
Phoenix, AZ 85005

**Honeywell**

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# DIRECTOR OF ACADEMIC COMPUTING

Applications are sought for Director of Academic Computing, Office of Computing Activities, University of Virginia. The position heads a Center providing computer support for research and instructional programs of the University and for other institutions of higher education in the Commonwealth. Primary hardware includes a CDC CYBER 172 and dual HP2000 ACCESS systems. Full-time staff numbers 33. The successful candidate will have an advanced degree in Computer Science or related field, at least two years experience in computer center management, and a record demonstrating technical expertise, administrative skills, and an ability to work effectively with a wide variety of computer users, preferably in an academic environment. Send resume stating salary requirement and names of three referencas by February 10 to the Director of Computing Activities, University of Virginia, P.O. Box 3856, Charlottesville, Va. 22903. An EEO/AA Employer.

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**DIRECTOR, OFFICE OF INFORMATION SYSTEMS
UNIVERSITY OF KANSAS MEDICAL CENTER
KANSAS CITY, KANSAS**

The Director is responsible for management of an IBM 370/158 (2M), systems development/maintenance, operations/production, and DDS to DS conversion in a DL/1, CICS, CAI, and teleprocessing network environment. The Office of Information Systems supports Medical Center campuses in Wichita and Kansas City (including a 500+ bed hospital).

Require minimum of Bachelor's degree; ten years data processing experience; three years as a director or the senior executive in a large complex information systems installation; experience in management of telecommunications software, networking, data management systems, and three-shift computer operations; candidates must also have effective communication skills, experience in dealing with senior management and users, and demonstratable management and technical skills. Advanced degree, medical center or hospital information systems management desirable. Salary to $32,000. Start April, 1978. Applications due February 15, 1978. Send resume with salary history to Dr. Richard L. Mann, University Director of Institutional Research/Information Systems, 223 Strong Hall, Lawrence, Kansas 66045.

An equal opportunity employer. Qualified men and women of all races and persons with disabilities are encouraged to apply.

# Data Processing System Architect/ Project Manager

MANAGEMENT CONSULTING DEPARTMENT OF INTERNATIONAL FIRM OF CERTIFIED PUBLIC ACCOUNTANTS is expanding design, development and implementation services to encompass a broad range of generalized data processing systems for private and public sector clients. Positions are available in several U.S. locations.

WE ARE SEEKING INDIVIDUALS WHO CAN TRANSLATE REQUIREMENTS and conceptual designs into transferable, state-of-the-art systems for a wide range of technological, environments. The successful candidate will possess the ability to work with clients, have good oral and written communications skills and a sound technical data processing background. Undergraduate college degree required (Master's degree desirable).
ete college degree required (Master's degree desirable).

Please submit resume including salary history and requirements along with geographic preferences (or limitations) to:

Mr. Ralph Dieckmann, 38th Floor,
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# DP Professionals

## San Francisco

Apply your expertise to our young, expanding Statewide Bank in the design and implementation of innovative DP programs throughout our Operations — utilizing TOTAL/7 Data Base Management Systems. Excellent growth opportunities exist for aggressive Professionals experienced on IBM 370/145 DOS/VS equipment.

## PROGRAMMER

Conceive and write programs for new applications covering the full spectrum of Bank activities. You must have a min. of 1 yr. exp. as a COBOL programmer in a DOS environment.

## PROGRAMMER/ANALYST

Become involved in the design and programming of several leading edge systems for our expanding operations throughout California. You must have approximately 3 yrs. exp. to include at least 1 yr. as a Programmer/Analyst; prior financial systems and/or DBMS design exp helpful. Good communications skills essential as you will be interfacing with all levels of management.

We offer unusual challenge, excellent benefits and a progressive DP environment. Please send your resume, including salary history, to M. Tenner, Dept. 96, The Chartered Bank of London, 100 Montgomery St., San Francisco, CA 94104.

**The Chartered Bank of London**

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## SEE OUR FULL PAGE AD FOR SYSTEMS ENGINEERS ON PAGE 37

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# INFORMATION SYSTEMS DIRECTOR

State of Minnesota needs EDP professional to manage comprehensive EDP processing system. Involves 380 employees, 12M annual budget, average 17,000 jobs per month. Requires extensive EDP management experience, direction of systems programming and operation functions of large scale multi-processing, multi-vendor installations with communications-based, real-time and large batch-processing systems. Salary $28,084-35,400/year. Send inquires to:

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# THE SEARCH IS ON AT HONEYWELL - PHOENIX

We are seeking first rate hardware engineering talent to augment our top professional teams expanding to meet tomorrow's challenges.

We offer interesting work in an exciting and challenging environment and a total commitment to creating the best product on the market. Our pace is fast but for the qualified, the career rewards are great.

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- SR. DIAGNOSTIC ENGINEERS CONVERSANT WITH FAULT SIMULATION TECHNIQUES
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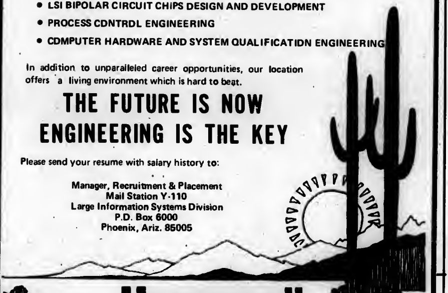
- LARGE SCALE CPU AND I/O LOGIC — DIGITAL DESIGN
- LSI BIPOLAR CIRCUIT CHIPS DESIGN AND DEVELOPMENT
- PROCESS CONTROL ENGINEERING
- COMPUTER HARDWARE AND SYSTEM QUALIFICATION ENGINEERING

In addition to unparalleled career opportunities, our location offers a living environment which is hard to beat.

## THE FUTURE IS NOW ENGINEERING IS THE KEY

Please send your resume with salary history to:

Manager, Recruitment & Placement
Mail Station Y-110
Large Information Systems Division
P.O. Box 6000
Phoenix, Ariz. 85005



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**Philadelphia Retail**

Seasoned RETAIL SYS & PROCEDURES pro reqd for hi visibility position w/DelVal based chain. Excel WRITTEN & ORAL COMMUNICATOR w/innovative approach to development of daily store policy & procedures essential. Also respon for updating of CORP MANUAL OF OPERATIONS. Any finl bkgd highly pfrd. Depending upon exp, salary to $22K.

**ROBERT HALF PERSONNEL AGENCIES**
2 Penn Center, Suite 706
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(215) 568-4580

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# COMPUTER LEASING SALESMAN

IPS Computer Marketing Corp. is a major dealer and lessor of used IBM computer equipment. We are looking for an experienced leasing salesman for our office in Fort Lee, New Jersey. Will have responsibility for leases in present portfolio, lease brokerage, and leasing of new IBM processors. At least five years successful sales experience required, with minimum of two years in leasing field. Prefer someone now living in New York City area. High earnings potential through commissions. Please send resume (no telephone calls) to G.H. Heilborn, President.

**IPS**

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# EDP AUDITOR

## Professional Advancement

Gerber Products Company has an immediate opening on its Internal Audit Staff for an EDP Auditor. First consideration will be given to those candidates with the following qualifications.

- Degree in accounting with minor in computer science
- Ability to program in one or more of the following: COBOL, RPG, Fortran, Basic.
- Minimum of 3 years EDP Auditing, Systems Design or Data Processing Administration experience with a major computer installation.

This opening is at Corporate Headquarters in Fremont, Michigan. The comapny utilizes a 370/148 in communication with computers at plants throughout the United States.

Please send your resume in complete confidence to Edward T. Guzik, Manager-Employment and Compensation.

**Gerber Products Company**

445 State Street
Fremont, Michigan 49412
An Equal Opportunity Employer

# Corporate Product/ Software Evaluation

NCR Corporation, a major manufacturer of computers and terminals, is seeking career-minded individuals with proven performance records to function as staff members in Corporate Market and Product Evaluation in NCR's World Headquarters, Dayton, Ohio.

In this highly visible position you will:

- Interface with end serve as a consultant to Marketing, Design Engineering, Product end Software Development, and Pricing.
- Collect, monitor, and evaluate hardware/software information.
- Be responsible for assuring, coordinated, effective and documented evaluations of products end/or software from a competitive or user-sensitive viewpoint.

Likely candidate will possess a college degree and related hardware and/or software experience obtained from one or more of the following: EDP sales experience, EDP software experience from applications or operating software development, EDP product management, or development.

Position offers excellent growth and salary, along with excellent benefits including medical end pension plus stock purchase, paid relocation, recreational facilities and others.

*Send resume in complete confidence along with salary history ro:*

**NCR**
Complete Computer Systems

Mr. Max Anderson
Corporate Executive end
Professional Recruitment
NCR Corporation
Dayton, Ohio 45479

*An Equal Opportunity Employer*

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# SENIOR BUSINESS SYSTEMS ANALYST

Duties include feasibility studies, definition of user requirements, development of functional system's specifications, documentation of mainframe/micro-computer systems, and responsibility for engineering systems development and implementation.

Two to five years direct experience with engineering applications required. BSEE/BSCIS preferred, MS or MBA a plus. Experience with data base systems concepts and a working knowledge of engineering change effectivity desired. Good oral and written communications skills and a sound technical background are essential.

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Department C 130
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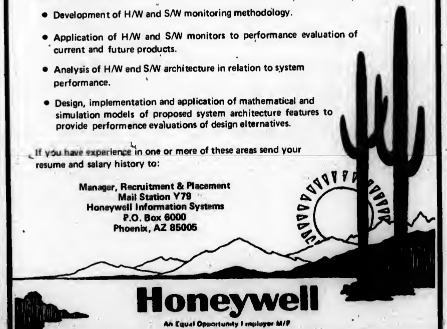

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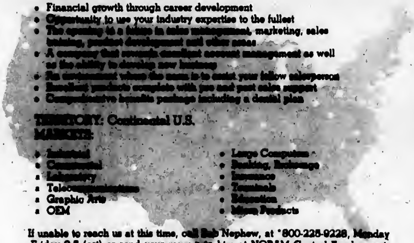

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# SAN FRANCISCO

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Work in a State-of-the-Art environment with 370/155, 168, 195, SYS 3 (Mod 15), SYS 32, and various minicomputers under OS, MVS, DOS, IMS, CMS-VM. Decimus offers salaries commensurate with your expertise/contribution and outstanding benefits.

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**Business Systems Division**
3 Corporate Park Drive
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Attention: D J. Van Den Berg
Vice President, Marketing

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## PROGRAMMER/ANALYST

### IBM 370, DOS/VS, COBOL, RPG II

Standard Plastic Products, a subsidiary of Mattel Inc., the world's leading toy manufacturer, seeks a talented programmer/analyst to join our expanding department.

The successful candidate should possess at least 4 years of systems/programming experience; thorough knowledge of COBOL, BAL, RPG II and DOS/VS with the ability to apply that knowledge to IBM 370 and/or Systems III, Model 15D. Knowledge of Teleprocessing (3740 seriesa) desirable, but not mandatory.

You will be involved in all aspects of project development as well as assisting in systems design, evaluating hardware/software requirements, interfacing with user depts and creating documentation.

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## SYSTEMS PROGRAMMER II

The University of New Mexico Computer Center has an opening for an experienced OS Systems Programmer II. Configuration: IBM S/360 Model 67, 2048K, Running OS-MVT with HASP. Major job responsibilities: Generate, Maintain, Modify, Document, and Consult (all on OS). Requirements: Bachelors Degree, at least three years programming experience, (one year of which consists of working with as an OS Systems Programmer). Knowledge of 360 architecture, Assembler Language, and two high level languages. Starting salary range: $15,413-$18,828 per year.

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HOUSTON, TEXAS 77088
(713) 961-5580
ATTN: TOM MEEHAN

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SAN FRANCISCO, CAL. 94104
(415) 981-7008
ATTN: TERRY MC MAHON

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## DEC PROGRAMMER/ANALYST

Dynamic, upstate New York marketing organization is looking for a Programmer/Analyst with at least two years experience with DEC RSTS Basic-Plus System; preferably on 11/70. Commercial background desired in order processing, inventory control, and accounting applications. Ability to deal with user groups is essential.

We can offer you a friendly working environment, good starting salary, excellent benefits and profit sharing. Send resume and salary history in confidence to CW Box 1366, 797 Washington St., Newton, MA. 02160.

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## SYSTEMS PROGRAMMER II

For computing facility at National Center for Atmospheric Research in Boulder, Colorado. Involves maintenance/consulting activities on existing MODCOMP II RJE system, writing necessary protocol code for network control computers (NCC) telephone satellite links and helping with the connection of satellites to these links. Performs all functions of digital computer programming applicable to system software design and maintenance. Requirements: BS in Computer Science, Mathematics, Electrical Engineering or applicable field plus 3-4 years experience in above areas. Also required is knowledge of one or more of following minicomputers: MODCOMP II, SEL 32/55, DEC 11 plus experience with digital data links via telephone lines. Salary range $14,300 to $17,900 annually plus fringe benefits. Send resume to Tim Schick, NCAR, P.O. Box 3000, Boulder, Colo. 80307. Equal Opportunity Employer M/F.

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Design, implementation and supervision of large systems, exposure to data base. 5-7 years experience.

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3-5 years erxpereince

## PROGRAMMER ANALYST

2-3 years expereince

## PROGRAMMER

1-2 years experience

## REQUIREMENTS

COBOL or Fortran language,
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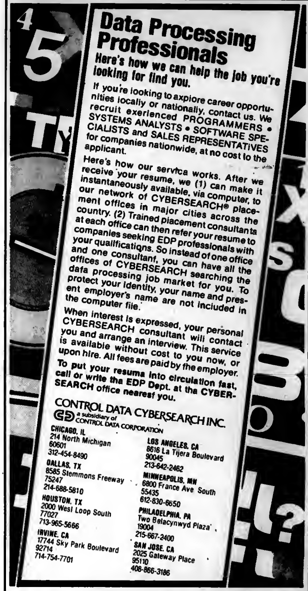

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**The College of Idaho**
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Design and develop hardware and software test concepts and environments to support operational software and computer systems test.

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# SYSTEMS PROGRAMMERS

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# UNIVERSITY OF NEW HAMPSHIRE

# DEC system 10

The University of New Hampshire (conveniently located near mountains, lakes, seashore, and Boston) has immediate openings for experienced computer professionals. The Office of Computer Services, with its centrally located dual-KL DECsystem10, provides both batch and timesharing services to the entire University System network (comprising 5 remote stations and over 150 interactive terminals) for administrative, instructional, and research applications.

## SYSTEMS PROGRAMMERS

Challenging projects currently underway include: design and implementation of mini-based distributed network, investigation and feasibility studies of array and floating-point processors. Responsibilities include: monitor generation and maintenance, performance analysis, and operation system modification.

Minimum qualifications — Computer Specialist III: Bachelor's degree or equivalent experience plus 3 years experience on large-scale timesharing systems, 1 year of which must be in operating systems work. Salary range: $11,616 to $18,048.

## DATA BASE SOFTWARE SPECIALIST

Develop and maintain software for on-line data entry and data base update systems. Install and maintain data base management software. Provide technical assistance to applications teams in the use of DBMS software and MIS data base design.

Minimum qualifications - Computer Specialist III: Bachelor's degree or equivalent experience plus 3 years experience on large-scale timesharing systems. Salary range: $12,780 to $19,824.

## PROGRAMMER ANALYST-AUXILIARY SERVICES

Collaborate with team leaders and other team members in designing, developing, and implementing computer applications in the auxiliary services area (inventory, order entry, and purchasing). Multilingual background (especially COBOL) and data base experience desirable.

Minimum qualifications - Computer Specialist III: Bachelor's degree or equivalent experience plus 3 years experience on large-scale timesharing systems. Salary range: $12,780 to $19,824.

Resumes should be submitted no later than February 10, 1978 to:

**Mr. Bill Vasiliou, Director**
**University of New Hampshire**
**Computer Services, Kingsbury Hall**
**Durham, N.H. 03824**

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# SOFTWARE EVALUATION FOR FINANCIAL TERMINAL SYSTEMS

Engineering & Manufacturing-Dayton develops and produces financial terminal products. Opportunities currently exist in Quality Assurance for Software Evaluation Analysts to perform design analysis and Q.A. certification on a project basis for financial terminal systems. Must be familiar with multi-tasking O.S. concepts and have the ability to design and code test software in 8080 Assembly language or COBOL. An understanding of banking systems would be helpful.

These positions are located at NCR's Engineering & Manufacturing Division in Dayton, Ohio. If you are a self-motivated professional and believe you qualify, please submit your resume and salary requirements to:

Mrs. J.E. Chorazewitz
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Engineering & Manufacturing-Dayton
NCR Corporation
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# Deputy Project Director

The National Center for State Courts is seeking a Senior level professional familiar with court information systems and project management. This individual will assist in establishing procedures and standards for assessment of Judicial Information Systems and grant review activities, coordinating project deliverables, and performing other activities as required. The position requires a highly capable individual with three years of experience in court administration or a related criminal justice field. Additional qualifications include bachelor degree from an accredited college or university and knoweldge of judicial information systems, statistics, and system analysis techniques. Graduate degree in law, public, or business administration preferred. Salary dependent on background, experience, and other qualifications. Send resume to

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**National Center for State Courts**
**300 Newport Avenue, Williamsburg, Virginia 23185**
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# SYSTEMS CAREERS FOR SYSTEMS PROFESSIONALS

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**SENIOR PROGRAMMERS**
Responsibilities including development and implementation of new programs including batch and inter-active systems.

**SENIOR SYSTEMS ANALYSTS**
Design new state of the art systems in coordination with progressive management. Conduct feasibility studies, reoptimization of existing systems, and interface with all levels of management.

**PROCEDURES ANALYSTS**
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# Assistant Director
## Data Processing

**Insurance Background Essential**

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**SYSTEMS PROGRAMMERS:** Responsibilities include operating software systems programming support for the online/interactive environment, development and use of configuration and network measurement and management tools, performance of periodic capacity planning reviews, etc.

Applicants should have a broad background in areas relating to computer technology and systems development, including hardware, operating systems, communications, online/interactive environments, several high level programming languages, compilers and interpreters, etc. Computer Science Degree and minicomputer exposure are desirable.

Please send resume and salary history and requirements in confidence to:

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# SYSTEMS SOFTWARE PROGRAMMER

Resulting from the upgrade of our Corporate Computer System, we have an opening for an experienced VM and VS/1 Systems Software Programmer. Position responsibilities include implementation and maintenance of system software, an online data base management system, and training and education of data processing personnel. A thorough understanding of BAL and a degree in Computer Science are preferred.

We offer an attractive starting salary, comprehensive benefits and a solid potential for future growth. Send resume with salary history to:

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DATA PROCESSING

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**DOCUMENTATION PERSONNEL** — Two to five years experience in establishing systems and overall data processing documentation and standards. Succinct and usable documentation will be created from the ground up.

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For the national scope State Judicial Information System (SJIS) Project of the National Center for State Courts. Applicants should have bachelor's degree or higher and three years experience in information systems evaluation and analysis techniques. Judicial and/or criminal justice information systems experience desirable. Knowledge of PROMIS, SJIS, OBTS/CCH, and Cost/Benefit Analysis preferred. Responsibilities include SJIS assessment, system documentation, information transfer, and technical assistance activities. Good writing, communication, and analytical skills required.

Position involves some travel throughout the United States. Salary dependent on knowledge, experience, and other qualifications. Full time position begins January, 1978 in Williamsburg, Virginia. Send resume, salary history, and salary desired to:

**National Center for State Courts**
300 Newport Avenue
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EOE

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# SYSTEMS ANALYST

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# REAL-TIME PROGRAMMERS

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- 1-3 years experience in Assembly language with mini or microcomputers 8080 experience a plus
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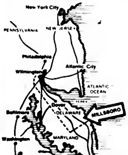

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**Engineering & Manufacturing-Millsboro**
**NCR Corporation**
**P.O. Box 607**
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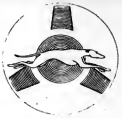

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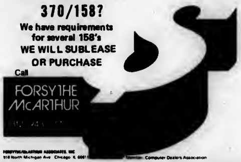

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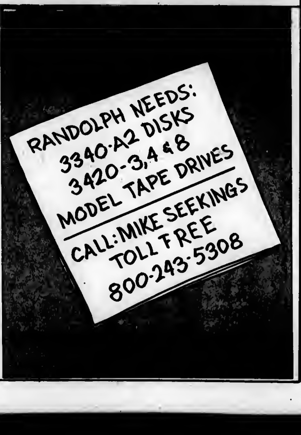

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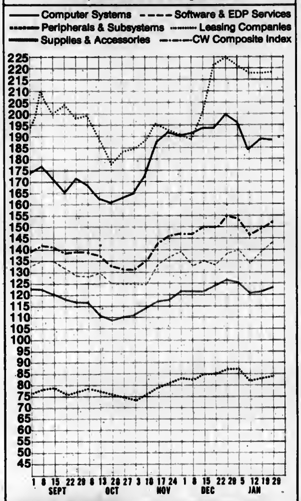

# Earnings Reports

### APPLIED MATHEMATICS
Three Months Ended Dec. 31

| | 1977 | 1976 |
|---|---|---|
| Shr Ernd | $.08 | ..... |
| Revenue | 15,406,000 | $13,963,000 |
| Earnings | 341,000 | (123,000) |

### BURROUGHS
Year Ended Dec. 31

| | 1977<br>(000) | 1976<br>(000) |
|---|---|---|
| Shr Ernd | $5.31 | $4.62 |
| Revenue | 2,126,822 | 1,901,849 |
| Earnings | 215,190 | 185,904 |
| 3 Mo Shr | 2.32 | 2.04 |
| Revenue | 679,134 | 589,041 |
| Earnings | 94,074 | 81,978 |

### CAMBRIDGE MEMORIES
Three Months Ended Dec. 2

| | 1977 | 1976 |
|---|---|---|
| Shr Ernd | $.11 | $1.63 |
| Revenue | 2,106,000 | 1,881,000 |
| Tax Cred | 87,000 | 81,000 |
| Spec Cred | ..... | a2,541,000 |
| Earnings | 208,000 | 2,764,000 |

a-Gain on extinguishment of certain indebtedness arising from sale of previously leased equipment.

### MEMOREX
Year Ended Dec. 31

| | 1977 | 1976 |
|---|---|---|
| Shr Ernd | $8.83 | $7.01 |
| Revenue | 450,112,000 | 344,623,000 |
| Tax Cred | 22,268,000 | 18,254,000 |
| Earnings | 56,325,00 | 40,130,000 |
| 3 Mo Shr | 2.38 | 2.01 |
| Revenue | 124,043,000 | 100,055,000 |
| Tax Cred | 5,826,000 | 4,418,000 |
| Earnings | 15,415,000 | 11,598,000 |

### IBM
Year Ended Dec. 31

| | a1977<br>(000) | 1976<br>(000) |
|---|---|---|
| Shr Ernd | $18.30 | $16.64 |
| Revenue | 18,133,184 | 16,304,333 |
| Earnings | 2,719,414 | 2,398,093 |
| 3 Mo Shr | 3.38 | 4.47 |
| Revenue | 5,036,121 | 4,578,710 |
| Earnings | 797,379 | 673,996 |

a-Preliminary

# Computerworld Sales Offices

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# Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JANUARY 25, 1978

All statistics compiled, computed and formatted by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

### COMPUTER SYSTEMS

| EXCH | | PRICE 1977-78 RANGE (1) | CLOSE JAN 25 1978 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| A | RNOAHL CORP | 22- 33 | 49 3/4 | +1 | +2.0 |
| N | BURROUGHS CORP | 35- 91 | 65 1/4 | -1 7/8 | -2.7 |
| O | COMPUTER AUTOMATION | 18- 30 | 24 | 0 | 0.0 |
| N | CONTROL DATA CORP | 20- 29 | 23 5/8 | - 1/8 | -0.4 |
| C | CRAY RESEARCH INC | 15- 51 | 28 | + 1/2 | +1.8 |
| N | DATA GENERAL CORP | 35- 34 | 47 1/2 | - 1/2 | -1.0 |
| N | DATAPOINT CORP | 18- 41 | 53 1/8 | -1 1/4 | -3.4 |
| N | DIGITAL EQUIPMENT | 37- 33 | 42 1/2 | -2 5/8 | -5.2 |
| N | ELECTRONIC ASSOC. | 2- 3 | 2 1/4 | - 1/8 | -5.2 |
| A | ELECTRONIC ENGINEER. | 8- 14 | 14 5/8 | +2 1/2 | +21.0 |
| O | FOUR-PHASE SYSTEMS | 13- 23 | 21 1/4 | +1 3/4 | +8.9 |
| N | FOXBORO | 28- 54 | 50 3/8 | + 1/2 | +1.6 |
| C | GENERAL AUTOMATION | 6- 9 | 6 5/4 | - 3/8 | -5.2 |
| C | GRI COMPUTER CORP | 1- 1 | 3/8 | 0 | 0.0 |
| N | HEWLETT-PACKARD CO | 68- 87 | 68 | -2 5/8 | -3.7 |
| N | HONEYWELL INC | 43- 55 | 43 7/8 | - 7/8 | -1.9 |
| N | IBM | 245-286 | 263 7/8 | -5 3/8 | -1.2 |
| C | MANAGEMENT ASSIST | 5- 10 | 9 3/8 | + 3/8 | +4.1 |
| O | MICRODATA CORP | 7- 18 | 10 5/4 | + 1/2 | +4.8 |
| O | MINI-COMPUTER SYST | 5- 12 | 3 1/4 | -2 | -27.5 |
| C | MODULAR COMPUTER SYS | 5- 9 | 8 1/4 | +1 | +13.7 |
| N | NCR | 32- 47 | 40 1/2 | +1 5/8 | +4.1 |
| C | PRIME COMPUTER INC | 12- 25 | 23 1/8 | + 3/8 | +2.7 |
| N | PERKIN-ELMER | 17- 22 | 18 3/4 | + 1/2 | +2.7 |
| N | RAYTHEON CO | 16- 53 | 30 3/8 | +1 | +3.3 |
| N | SPERRY RAND | 30- 42 | 54 1/8 | -1 1/8 | -3.1 |
| C | SYCOR INC | 8- 21 | 20 1/2 | + 5/8 | +3.1 |
| A | SYSTEMS ENG. LABS | 5- 13 | 12 5/8 | - 1/8 | -1.0 |
| A | WANG LABS. | 10- 14 | 12 1/2 | - 1/4 | -1.9 |

### LEASING COMPANIES

| EXCH | | PRICE 1977-78 RANGE (1) | CLOSE JAN 25 1978 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| C | ALANTHUS CORP | 3- 8 | 3 3/8 | - 1/8 | -2.1 |
| C | BOOTHE COURIER CORP | 8- 14 | 13 1/4 | - 1/4 | -1.8 |
| C | COMDISCO INC | 10- 16 | 14 3/4 | - 1/4 | -1.6 |
| A | COMMERCE GROUP CORP | 1- 5 | 3/4 | 0 | 0.0 |
| A | COMPUTER INVSTRS GRP | 1- 2 | 7/8 | + | +7.6 |
| P | DATRONIC RENTAL | 0- 2 | 1 1/4 | 0 | 0.0 |
| A | DCL INC | 1- 3 | 2 7/8 | 0 | 0.0 |
| N | DRF INC | 6- 10 | 8 | 0 | 0.0 |
| N | ITEL | 13- 22 | 17 3/8 | - 1/4 | -1.4 |
| N | LEASCO CORP | 19- 27 | 24 1/2 | + 1/4 | +1.0 |
| C | LEASPAC CORP | 1- 2 | 1 5/8 | - 1/8 | -0.3 |
| A | PIONEER TEX CORP | 5- 11 | 5 5/8 | + 1/4 | +4.6 |
| N | U.S. LEASING | 10- 16 | 12 1/2 | - 1/4 | -1.9 |

### SOFTWARE & EDP SERVICES

| EXCN | | PRICE 1977-78 RANGE (1) | CLOSE JAN 25 1978 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | ADVANCED COMP TECN | 0- 2 | 1 3/8 | + 1/8 | +8.3 |
| C | ANACOMP INC | 7- 10 | 8 1/2 | 0 | 0.0 |
| A | APPLIED DATA RES. | 5- 10 | 8 1/2 | - 1/4 | -2.8 |
| N | AUTOMATIC DATA PROC | 23- 50 | 26 5/8 | + 1/4 | +0.9 |
| C | COLEMAN AMERICAN COS | 2- 2 | 1 5/4 | 0 | 0.0 |
| O | COMPU-SERV NETWORK | 9- 13 | 10 1/4 | - 1/2 | -4.6 |
| C | COMP ELECTION SYSTMS | 6- 10 | 9 1/4 | 0 | 0.0 |
| C | COMPUTER HORIZONS | 1- 1 | 1 1/2 | + 3/4 | +100.0 |
| C | COMPUTER NETWORK | 6- 11 | 8 5/4 | - 1/2 | -5.4 |
| A | COMPUTER SCIENCES | 7- 10 | 8 5/4 | - 1/8 | -1.4 |
| O | COMPUTER TASK GROUP | 1- 2 | 1 1/2 | 0 | 0.0 |
| C | COMPUTER USAGE | 1- 5 | 1 5/8 | 0 | 0.0 |
| O | COMSHARE | 5- 8 | 7 1/2 | + 3/4 | +11.1 |
| O | DATA DIMENSIONS INC | 3- 5 | 4 1/2 | - 1/8 | -2.7 |
| O | DATATAB | 1- 2 | 1 3/8 | 0 | 0.0 |
| N | ELECTRONIC DATA SYS. | 14- 20 | 15 1/8 | + 1/4 | +1.6 |
| O | INSYTE CORP | 2- 3 | 1 5/8 | + 1/8 | +10.0 |
| C | IPS COMPUTER MARKET. | 1- 2 | 2 1/8 | - 1/8 | -3.5 |
| O | KEANE ASSOCIATES | 3- 4 | 3 5/8 | 0 | 0.0 |
| C | KEYDATA CORP | 1- 3 | 1 5/8 | 0 | 0.0 |
| A | LOGICON | 7- 17 | 12 1/8 | + 1/4 | +2.1 |
| A | MANAGEMENT DATA | 1- 2 | 1 1/8 | - 1/8 | -10.0 |
| A | NATIONAL CSS INC | 10- 18 | 16 1/4 | - 3/4 | -4.4 |
| C | NATIONAL DATA CORP | 4- 7 | 7 | + 1/8 | +1.8 |
| A | ON LINE SYSTEMS INC | 16- 22 | 18 1/8 | +1 3/8 | +8.2 |
| N | PLANNING RESEARCH | 3- 6 | 4 7/8 | - 1/8 | -2.9 |
| C | PROGRAMMING & SYS | 1- 1 | 3/8 | 0 | 0.0 |
| O | RAPIDATA INC | 2- 5 | 3 | + 1/8 | +4.3 |
| O | REYNOLDS & REYNOLD | 17- 21 | 19 | - 1/4 | -1.2 |
| C | SCIENTIFIC COMPUTERS | 1- 4 | 3 7/8 | + 1/4 | +6.8 |
| O | TYMSHARE INC | 14- 25 | 20 3/8 | + 3/8 | +1.8 |
| A | URS SYSTEMS | 4- 3 | 3 | + 1/4 | +5.2 |
| N | WYLY CORP | 1- 2 | 5/4 | - | -7.7 |

### PERIPHERALS & SUBSYSTEMS

| EXCN | | PRICE 1977-78 RANGE (1) | CLOSE JAN 25 1978 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| N | ADDRESSOGRAPH-MULT | 10- 16 | 14 1/2 | + 3/8 | +4.5 |
| O | ADVANCED MEMORY SYS | 7- 9 | 8 1/4 | + 1/2 | +6.4 |
| N | AMPEX CORP | 8- 12 | 11 1/4 | + 1/8 | +1.1 |
| C | ANDERSON JACOBSON | 3- 6 | 4 7/8 | 0 | 0.0 |
| N | APPLIED DIG DATA SYS | 10- 20 | 15 3/8 | +2 3/8 | +17.9 |
| C | BEEHIVE INT'L | 5- 12 | 6 1/4 | + 3/8 | +11.1 |
| A | BOLT,BERANEK & NEW | 6- 9 | 3 7/8 | - 1/8 | -2.0 |
| N | BUNKER-RAMO | 8- 13 | 12 3/8 | + 3/4 | +6.3 |
| A | CALCOMP | 3- 3 | 2 7/8 | 0 | 0.0 |
| O | CAMBRIDGE MEMORIES | 1- 4 | 3 1/8 | + 1/4 | +10.8 |
| N | CENTRONICS DATA COMP | 16- 30 | 17 1/2 | + 1/2 | +2.9 |
| C | COGNITRONICS | 1- 1 | 1 | - | -3.9 |
| O | COMPUTER COMMUN. | 5- 8 | 6 3/8 | - 1/8 | -1.9 |
| C | COMPUTER CONSOLES | 4- 7 | 3 3/4 | 0 | 0.0 |
| R | COMPUTER EQUIPMENT | 2- 4 | 4 1/8 | + 5/8 | +17.8 |
| C | COMPUTER TRANSCEIVER | 1- 1 | 1 3/8 | 0 | 0.0 |
| C | COPTEN | 9- 13 | 10 3/8 | + 3/4 | +7.7 |
| N | CONRAC CORP | 19- 28 | 21 1/8 | + 3/8 | +1.8 |

| EXCN | | PRICE 1977-78 RANGE (1) | CLOSE, JAN 23 1978 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | DATA ACCESS SYSTEMS | 4- 3 | 3 1/4 | 0 | 0.0 |
| O | DATA 100 | 6- 11 | 8 1/4 | 0 | 0.0 |
| A | DATA PRODUCTS CORP | 9- 19 | 13 3/8 | - 1/8 | -0.8 |
| C | DATA TECHNOLOGY | 3- 4 | 4 1/4 | + 1/8 | +5.0 |
| C | DATUM INC | 1- 2 | 2 | 0 | 0.0 |
| C | DECISION DATA COMPUT | 2- 5 | 2 | + 1/8 | +6.6 |
| O | DELTA DATA SYSTEMS | 1- 1 | 1/2 | 0 | 0.0 |
| A | DOCUMATION INC | 6- 12 | 11 | + 1/8 | +1.1 |
| O | DATARAM CORP | 2- 24 | 18 1/2 | -1 | -5.1 |
| N | ELECTRONIC M & M | 4- 5 | 4 1/2 | + 1/8 | +2.8 |
| C | FABRI-TEK | 1- 2 | 1 1/8 | 0 | 0.0 |
| O | GENERAL COMPUTER SYS | 0- 2 | 1 1/4 | - 1/4 | -16.6 |
| N | HAZELTINE CORP | 8- 12 | 9 7/8 | 0 | 0.0 |
| N | HARRIS CORP | 28- 47 | 41 3/4 | +1 1/4 | +5.0 |
| R | INCOTERM CORP | 10- 19 | 17 1/2 | -1 | -5.4 |
| O | INFOREX INC | 4- 7 | 5 5/4 | 0 | 0.0 |
| O | INFORMATION INTL INC | 8- 14 | 8 1/4 | + 1/4 | +2.7 |
| C | INTEL CORP | 38- 57 | 43 1/2 | +1 | +2.5 |
| A | LUNDY ELECTRONICS | 3- 6 | 5 5/8 | + 1/8 | +5.5 |
| C | MSI DATA CORP | 6- 15 | 12 1/2 | - 1/4 | -1.9 |
| O | MEMOREX | 23- 34 | 29 | +1 5/8 | +5.9 |
| A | MOHAWK DATA SCI | 5- 8 | 5 3/4 | 0 | 0.0 |
| O | PENRIL CORP | 2- 6 | 5 1/4 | - 1/8 | -2.3 |
| N | PERTEC CORP | 7- 11 | 10 1/8 | 0 | 0.0 |
| A | POTTER INSTRUMENT | 2- 2 | 1 3/4 | 0 | 0.0 |
| O | PRECISION INST. | 2- 2 | 2 | 0 | 0.0 |
| O | QUANTOR CORP | 3- 3 | 5 3/8 | 0 | 0.0 |
| C | RECOGNITION EQUIP | 6- 10 | 7 | - 1/8 | -1.7 |
| G | SCAN DATA | 1- 2 | 1 | + | +10.3 |
| C | STORAGE TECHNOLOGY | 10- 22 | 19 3/8 | - 3/8 | -1.8 |
| G | T BAR INC | 7- 15 | 11 1/2 | + 3/8 | +3.5 |
| O | TALLY CORP. | 4- 6 | 4 1/2 | + 3/8 | +9.0 |
| A | TEC INC | 7- 10 | 7 | + 1/8 | +1.8 |
| N | TEKTRONIX INC | 29- 40 | 33 | 0 | 0.0 |
| N | TELEX | 2- 3 | 3 1/4 | + 5/8 | +15.8 |
| C | TESDATA SYSTEMS CP | 13- 20 | 13 3/4 | - 1/4 | -1.7 |
| O | WILTEK INC | 1- 1 | 1/2 | 0 | 0.0 |

### SUPPLIES & ACCESSORIES

| EXCN | | PRICE 1977-78 RANGE (1) | CLOSE, JAN 23 1978 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| B | AMERICAN BUS PRODS | 6- 8 | 7 | - 1/8 | -1.7 |
| P | BALTIMORE BUS FORMS | 1- 4 | 1 7/8 | 0 | 0.0 |
| A | BARRY WRIGHT | 10- 17 | 15 7/8 | + 3/8 | +2.4 |
| C | CYBERMATICS INC | 1- 1 | 7/8 | 0 | 0.0 |
| O | DUPLEX PRODUCTS INC | 14- 20 | 18 1/4 | + 1/8 | +0.6 |
| A | ENNIS BUS. FORMS | 6- 9 | 8 5/4 | + 1/8 | +1.4 |
| C | GRAPHIC CONTROLS | 13- 19 | 18 1/2 | + 5/4 | +4.2 |
| N | 3M COMPANY | 45- 36 | 47 | - 1/2 | -1.0 |
| C | MOORE CORP LTD | 24- 37 | 26 | - 1/2 | -1.8 |
| N | NASHUA CORP | 16- 28 | 20 1/4 | +2 1/8 | +11.7 |
| C | STANDARD REGISTER | 18- 23 | 20 1/2 | - 1/2 | -2.3 |
| C | TAB PRODUCTS CO | 8- 19 | 8 | + 5/8 | +4.9 |
| N | VARCO | 18- 22 | 19 3/4 | + 5/4 | +5.9 |
| A | WABASH MAGNETICS | 10- 13 | 11 | 0 | 0.0 |
| N | WALLACE BUS FORMS | 17- 21 | 19 | + 1/4 | +1.3 |

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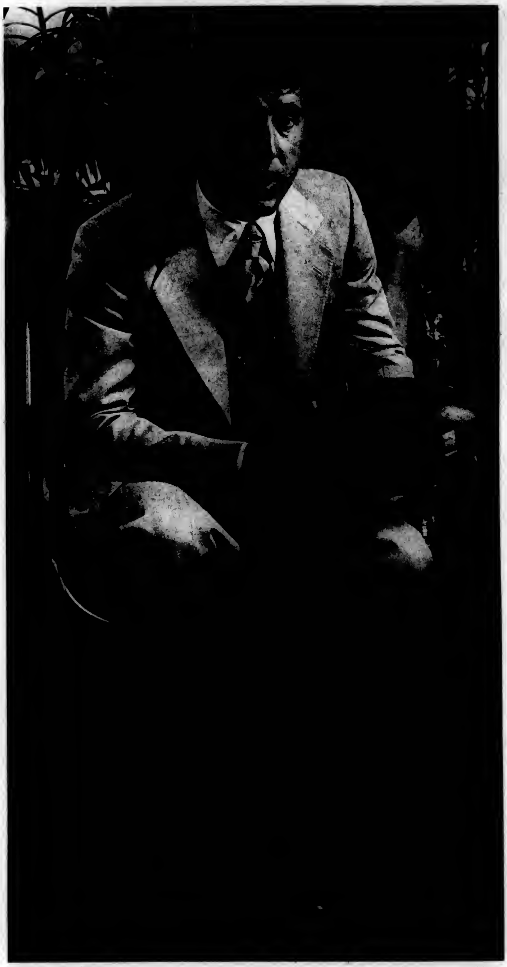

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